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Loneliness in Adolescence

Types of loneliness, measurement, and a meta-analytic perspective on group differences

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ASSOCIATIE KU LEUVEN

Marlies Maes (2016). Eenzaamheid in de adolescentie: Types van eenzaamheid, meting en een meta-analytisch perspectief op groepsverschillen

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Eenzaamheid is een onaangenaam gevoel dat ontstaat wanneer mensen een kwantitatief of kwalitatief tekort ervaren in hun sociale relaties (Perlman & Peplau, 1981). Het is een bijzonder relevant fenomeen tijdens de adolescentie, wanneer veel veranderingen in sociale relaties plaatsvinden. Onderzoek hiernaar is niet alleen belangrijk vanwege de sociale pijn die eenzaamheid met zich meebrengt, maar ook omdat het gezien wordt als een risicofactor voor vele mentale en fysieke problemen (Hawkley & Capitanio, 2015; Heinrich & Gullone, 2006). In dit doctoraat richtten we ons op drie onderbelichte onderwerpen: (1) types van eenzaamheid; (2) psychometrische kwaliteiten van een multidimensionele eenzaamheidsmeting; en (3) groepen die mogelijk extra kwetsbaar zijn voor het ervaren van eenzaamheid.

Ten eerste richtten we ons op intieme en relationele eenzaamheid. Het eerste is het gevoel een hechte band met iemand te missen (bijvoorbeeld met een ouder of beste vriend) en het tweede is het gevoel een netwerk van sociale relaties te missen. We identificeerden een groep adolescenten die zich intiem eenzaam voelden (in relatie met hun ouders), maar niet relationeel eenzaam (in relatie met een groep leeftijdsgenoten) en een andere groep adolescenten die zich relationeel, maar niet intiem eenzaam voelden. Bovendien vonden we dat deze groepen anders scoorden op verschillende aspecten van welzijn. In een andere studie keken we specifiek naar relaties met leeftijdsgenoten. Voor zes gevestigde eenzaamheidsmetingen specificeerden we welk type eenzaamheid ze meten. Uit de resultaten bleek wederom dat intieme eenzaamheid (in de dyadische context van vriendschappen) en relationele eenzaamheid (in de bredere context van een groep leeftijdsgenoten) onderscheiden konden worden.

Ten tweede richtten we ons op psychometrische kwaliteiten van de multidimensionele Leuvense Eenzaamheidsschaal voor Kinderen en Adolescenten (LEKA; Marcoen, Goossens, & Caes, 1987). We onderzochten de betrouwbaarheid van LEKA scores uit studies die werden uitgevoerd in verschillende groepen adolescenten. Bovendien onderzochten we meetinvariantie over geslacht, leeftijden en culturele groepen. De resultaten toonden aan dat de betrouwbaarheid van scores verkregen met de LEKA goed was over de verschillende groepen heen en dat de items en de onderliggende latente factoren van de LEKA vergelijkbaar geïnterpreteerd werden door jongens en meisjes, door participanten uit verschillende stadia van de adolescentie en door adolescenten uit twee heel verschillende culturele groepen.

Ten derde richtten we ons op fysieke gezondheid en geslacht. Deze twee factoren zouden individuen kwetsbaar kunnen maken voor het ervaren van eenzaamheid. Via multiniveau meta-analyses vonden we dat kinderen en jongeren met een chronisch fysieke aandoening, gemiddeld gezien, een beetje eenzamer waren dan hun leeftijdsgenoten zonder een dergelijke aandoening. Het is hierbij wel belangrijk op te merken dat individuen met een chronische aandoening een erg heterogene groep zijn, ook binnen specifieke aandoeningen. Wat betreft geslacht, vonden we dat mannen en vrouwen doorheen de levensloop erg vergelijkbaar zijn wat betreft gemiddelde eenzaamheidsscores.

Samenvattend biedt dit doctoraat een meta-analytisch perspectief op eenzaamheid betreffende types, meting en kwetsbare groepen. Naast het tegemoetkomen aan belangrijke hiaten in de eenzaamheidsliteratuur, roepen de resultaten ook nieuwe onderzoeksvragen op. Door suggesties voor toekomstig onderzoek aan te bieden, hopen we anderen te inspireren om onze huidige kennis uit te breiden en het eenzaamheidsonderzoek vooruit te brengen.

Marlies Maes (2016). Loneliness in adolescence: Types of loneliness, measurement, and a meta-analytic perspective on group differences

Supervisor: Prof. Dr. Luc Goossens
Co-supervisor: Prof. Dr. Wim Van den Noortgate

Loneliness is the unpleasant feeling that occurs when people perceive their social relationships to be deficient in a quantitative or qualitative way (Perlman & Peplau, 1981). Experiences of loneliness are especially salient during adolescence, when many changes in social relationships occur. Studying adolescent loneliness is important, not only because of the social pain it involves, but also because it is considered to be a risk factor for many mental and physical problems (Hawkley & Capitanio, 2015; Heinrich & Gullone, 2006). In the present dissertation we focused on three understudied topics. Specifically, we examined (1) different types of loneliness; (2) psychometric characteristics of a multidimensional loneliness measure; and (3) groups of individuals that may be especially vulnerable to experiences of loneliness.

First, we focused on intimate loneliness (i.e., the feeling of lacking a close, intimate attachment to another person) and relational loneliness (i.e., the feeling of lacking a network of social relationships) as different types of loneliness. We identified one group of adolescents that felt intimately lonely (in relation to their parents), but not relationally lonely (in relation to their peer group), and another group of adolescents that felt relationally, but not intimately lonely. Moreover, we found that these groups of adolescents scored differently on several aspects of well-being. In another study, we specifically zoomed in on adolescent loneliness in the peer context. We included six established loneliness measures and specified which type of loneliness they tap into. Results again indicated that intimate loneliness (in the dyadic context of friendship) and relational loneliness (in the broader context of the peer group) could be distinguished.

Second, we focused on psychometric characteristics of the Loneliness and Aloneness Scale for Children and Adolescents (LACA; Marcoen, Goossens, & Caes, 1987), which is a multidimensional measure commonly used with adolescents. We examined the reliability of scores obtained with the LACA in studies that have used this measure in different groups of adolescents. Moreover, we examined measurement invariance across gender, age, and cultural groups. Results indicated that the reliability of scores obtained with the LACA was good across the different groups studied, and that the items as well as the underlying latent factors of the LACA were interpreted similarly by boys and girls, by participants from different stages in adolescence, and by adolescents from two very different cultural groups.

Third, we focused on health status and gender as characteristics that may make individuals vulnerable to experiences of loneliness. Using multilevel meta-analytic techniques, we found that children and adolescents with chronic physical conditions were, on average, somewhat lonelier than their peers without such conditions. However, it is important to keep in mind that individuals with chronic conditions constitute a very heterogeneous group, even within specific conditions. Regarding gender, we found that males and females across the lifespan were very similar regarding mean levels of loneliness.

In sum, the present dissertation provided a meta-analytic perspective on types of loneliness, measurement, and vulnerable groups. In addition to addressing important gaps in the loneliness literature, the results of the present dissertation raised new questions. By providing avenues for future research, we hope to inspire others to extend our current knowledge and to move the field of loneliness research forward.

Dankwoord

Samen zijn
Is sterker dan de sterkste storm
Gekleurder dan 't grauwe om ons heen
Want samen zijn
Ja samen zijn
Dat wil toch iedereen

(Paul de Leeuw, Samen zijn)

Onderzoek doe je samen. Zo ook mijn doctoraat over eenzaamheid. Op deze plek in mijn proefschrift wil ik dan ook graag mijn promotor, copromotor, collega's, vrienden en familie bedanken voor alle steun, bijdragen, interesse en geduld tijdens de afgelopen jaren. Enkele mensen wil ik daarbij graag persoonlijk bedanken.

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Wil je snel gaan,
ga dan alleen.
Wil je ver komen,
ga dan samen.

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1

General Introduction

Tiefe Einsamkeit ist erhaben,
aber auf eine schreckliche Art.

(Immanuel Kant)

1. Introduction

The need to belong is a universal phenomenon, representing the fundamental desire of all humans to form social attachments (Baumeister & Leary, 1995). When something is missing in these social attachments, people experience a form of social pain, that is, they experience loneliness (Cacioppo, Cacioppo, et al., 2015). Researchers generally define loneliness as the unpleasant feeling that occurs when people perceive their network of social relationships to be deficient in a quantitative or qualitative way (Perlman & Peplau, 1981). It is thus a subjective feeling that occurs when people are not satisfied with either the amount or the quality of their social relationships. People may feel lonely when alone, but also when they are surrounded by other people. Hence, loneliness is different from being alone (i.e., aloneness), which is the objective experience of being without company (Long & Averill, 2003).

The evolutionary theory of loneliness builds on the need to belong theory (Baumeister & Leary, 1995) and emphasizes the evolutionary origins of loneliness. Specifically, forming and maintaining social connections is necessary for the survival of human genes, and loneliness serves as an innate biological warning system that signals to people that something is missing in their social relationships (Cacioppo, Cacioppo, et al., 2015). Just as physical pain, hunger, and thirst are innate biological warning systems to motivate humans to minimize damage to the physical body, loneliness motivates people to reconnect with others and to minimize damage to the social body. Not addressing or solving experiences of loneliness in a satisfactory way, leads to several detrimental outcomes: Lonely people have been found to have more psychological and physical problems, and to die at an earlier age (for reviews, see Ernst & Cacioppo, 1999; Goossens et al., 2015; Hawkley & Capitanio, 2015; Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015).

Many researchers, policy makers, and practitioners assume that loneliness is a problem of the elderly, thereby overlooking the importance of this phenomenon for younger individuals. In fact, previous research has found that loneliness peaks not only among the elderly, but also among adolescents (Qualter et al., 2015). Adolescence is a developmental period broadly defined by the World Health Organization as young people between the ages of 10 and 19 years (WHO, 2016). Loneliness might be especially salient in adolescence, due to the many changes in social expectations, roles, and relationships that occur during this developmental period (Heinrich & Gullone, 2006; Majorano, Musetti, Brondino, & Corsano, 2015; Qualter et al.,

2015). On the one hand, adolescents are expected to connect with peers and have close and intimate friends. On the other hand, gaining autonomy and independence is a central developmental task in this phase of life. Adolescents may therefore struggle to find a balance between social connectedness and independence, which may lead to increased feelings of loneliness (Larson, Richards, Moneta, Holmbeck, & Duckett, 1996).

Research focusing on adolescence has shown that loneliness is associated with poorer well-being (for reviews see Goossens, 2006; Hawkley & Capitanio, 2015; Heinrich & Gullone, 2006; Mahon, Yarcheski, Yarcheski, Cannella, & Hanks, 2006; Qualter et al., 2015). For example, adolescent loneliness has been associated with adjustment problems, including lower self-esteem, higher rates of school dropout and juvenile delinquency, as well as higher anxiety, depressive symptoms, and suicide ideation (Hawkley & Capitanio, 2015; Heinrich & Gullone, 2006; Mahon et al., 2006). Moreover, loneliness has been associated with physical problems, such as poor sleep quality and shorter sleep duration, and an increased frequency of doctor visits (Hawkley & Capitanio, 2015). In addition, research has shown that loneliness is associated with intrapersonal factors, such as introversion, shyness, and lower self-disclosure (Mahon et al., 2006; Qualter et al., 2015), and with interpersonal factors, such as an insecure attachment style, peer rejection and victimization, and a lack of high quality friendships (Goossens, 2006; Heinrich & Gullone, 2006; Mahon et al., 2006). Hence, loneliness is an important phenomenon to study in adolescence.

2. Loneliness in Adolescence: Types, Measurement, and Vulnerable Groups

Loneliness is thus a highly significant research topic, not only because of the emotional pain it involves, but also because of its risk for many adverse outcomes. Consequently, it is of great fundamental and clinical importance to know how the experience of loneliness may manifest itself, how we can measure this experience, and whether there are groups that are especially vulnerable in this regard. Although research on loneliness has increased sharply over the last decades – with about 140 empirical studies published in 1980-1989 to almost 800 in 2000-2009 – important questions have remained unresolved. In the present dissertation, we aim to address three important understudied topics in research on adolescent loneliness. Specifically, we (1) examine whether different types of loneliness can be distinguished; (2) investigate psychometric characteristics of a multidimensional loneliness measure; and (3) check whether health status (individuals with versus without chronic physical conditions) and gender (males

versus females) are associated with higher levels of loneliness. In the remainder of this chapter, we will discuss these three objectives and describe how they will be addressed in the different chapters of the present dissertation (see also Figure 1.1).

2.1 Distinguishing among different types of loneliness

According to the social needs perspective, different types of social relationships fulfill different social needs (Weiss, 1974). For example, an individual may have a close, intimate attachment to another person, such as a parent, best friend, or romantic partner, which fulfills the social need of attachment. However, when this same individual does not belong to a network of social relationships, such as a group of friends, the need of social integration remains unfulfilled. Weiss hypothesized that such an individual would experience a different type of loneliness than someone who does belong to a network of social relationships, but lacks an intimate attachment to another person. Previous research has emphasized the importance of distinguishing among types of loneliness, as different types are related to problems in different domains and to different forms of psychopathology (e.g., DiTommaso, Brannen, & Best, 2004; Lasgaard, Goossens, Bramsen, Trillingsgaard, & Elklit, 2011). Moreover, distinguishing among types of loneliness reveals crucial information about the sources of loneliness (e.g., a lack of an intimate attachment versus a lack of a social network), which could be of significance when tailoring interventions to specific individuals. However, most studies still assess loneliness as a unidimensional phenomenon, or only include a single type of loneliness.

In previous research, separate instruments have been used to assess different types of loneliness. Only recently, an overarching framework has been developed that can be used to connect these different types of loneliness measures (Cacioppo, Grippo, London, Goossens, & Cacioppo, 2015). The present dissertation adds important knowledge to the current loneliness literature by applying different types of loneliness measures to this framework. In the framework of Cacioppo, Grippo, et al., three types of loneliness are distinguished, that is, intimate, relational, and collective loneliness. Intimate loneliness refers to the feeling of lacking a close, intimate attachment to another person (e.g., adolescents may feel that they do not have a best friend). Relational loneliness refers to the feeling of lacking a network of social relationships (e.g., adolescents may feel that they do not belong to a peer group). Collective loneliness refers to experienced discrepancies in one's valued social identities and connections with similar others. These similar others are not necessarily known and constitute broader

groups, such as one's school, neighborhood, or cultural group (e.g., adolescents may feel that they do not belong to the community they live in).

Based on theoretical grounds, many existing and well-validated measures can be categorized into one of the three proposed types of loneliness, but empirical evidence for this classification of loneliness instruments if rather scarce. When selecting a loneliness measure it is crucial to know which type of loneliness it taps into. Moreover, when interpreting or comparing findings across individual studies it is important to know whether similar of different types of loneliness were captured in the different studies.

The present dissertation focuses on loneliness measures that assess intimate and relational loneliness. Within these two broad types of loneliness, experiences of loneliness may occur in different relationship contexts. For example, intimate loneliness can be experienced in relation to a parent, a best friend, or a romantic partner. Relational loneliness can be experienced in relation to the family, a network of friends, or a group of colleagues. The present dissertation focuses on two key interpersonal contexts for adolescents, that is, the parent and peer context. In early adolescence, parents occupy a central position in adolescents' personal network, but this position is gradually taken over by friends (Steinberg & Morris, 2001). This transition, however, does not mean that adolescents do not need parental support anymore. So, both the parent and peer context remain important to the adolescent.

In Part 1 of the present dissertation (i.e., Chapters 2, 3, and 4), we examine whether intimate and relational loneliness can be distinguished in both the family and peer context. In **Chapter 2**, we examine whether intimate loneliness (in relation to parents) can be distinguished from relational loneliness (in relation to the peer group), as assessed with the LACA. More specifically, we want to investigate whether there are groups of adolescents that experience one type of loneliness, but not the other. For this purpose, we use a person-centered approach by conducting cluster analyses. Moreover, if such groups of adolescents can be identified, we examine whether they differ on several concepts related to adolescents' well-being (i.e., self-esteem and personality, parental responsiveness and psychological control, and peer group functioning and friendships).

A distinction between loneliness in relation to parents and peers, however, might be due to a difference in context (i.e., family versus peer context) or to a difference in loneliness type (i.e., intimate versus relational loneliness). Moreover, throughout adolescence, the peer context

becomes increasingly important. Therefore, in Chapters 3 and 4, we zoom in on the peer context and examine whether intimate loneliness (in relation to a friend) and relational loneliness (in relation to the peer group) can be distinguished. Specifically, in **Chapter 4**, we focus on six established loneliness measures that are commonly used in adolescent samples, consisting of eight subscales in total. Not all of these measures have been designed to tap into a particular type of loneliness. Therefore, in Chapter 4, we examine how these measures are related to one another, and whether the two types of loneliness can be distinguished. However, for one of these measures, that is, the Children's Loneliness Scale (CLS; Asher & Wheeler, 1985), researchers have argued that the measure does not only assess loneliness, but also taps into social satisfaction (e.g., Bagner, Storch, & Roberti, 2004; Galanaki, Polychronopoulou, & Babalis, 2008; Kochenderfer-Ladd & Wardrop, 2001). So, before we can include this measure in the analyses described in Chapter 4, we need to examine whether this measure includes concepts other than loneliness. In **Chapter 3**, therefore, we zoom in on the factor structure of the CLS. Some researchers have argued for a two-factor structure that is based on the distinction between loneliness and social dissatisfaction. Other researchers, however, have stressed the possibility that the wording of items may be responsible for the two-factor structure of the CLS, and suggested a one-factor model that takes into account item wording (Ebesutani et al., 2012). We clarify the factor structure of the CLS by testing a model with two separate factors, reflecting loneliness and social dissatisfaction, against a model with a single factor that takes item wording into account. The latter model would suggest that the CLS taps into a single concept, that is, loneliness, and that this measure can be included in the analyses described in Chapter 4.

2.2 Examining psychometric properties of a multidimensional loneliness measure

Many studies have examined loneliness across different groups of adolescents, such as age, gender, and cultural groups. However, for such comparisons to be meaningful, it is important to know whether the instrument used is equally reliable and measuring the same underlying concept across these groups. Several multidimensional measures have been developed to assess different types of loneliness. A multidimensional measure that has been commonly used in adolescent samples is the Loneliness and Aloneness Scale for Children and Adolescents (LACA; Marcoen, Goossens, & Caes, 1987). This measure has been developed in Dutch for use in the age range of 10-19 years (Goossens, 2016). Since its development, the scale has been adapted and translated in numerous languages (i.e., Arabic, Chinese, English,

Greek, Hebrew, Italian, Spanish, and Portuguese). However, it is unclear whether the LACA is equally reliable and measuring the same underlying concepts across different groups.

In Part 2 of the present dissertation (i.e., Chapters 5, 6, and 7), we examine reliability and measurement invariance of the LACA across age, gender, and cultural groups. In **Chapter 5**, we examine the reliability of LACA scores obtained in studies that have used this measure in a diverse set of contexts. The reliability of scores on a questionnaire is often presented by Cronbach's alpha. Cronbach's alpha is sample dependent and should therefore be computed in each sample separately. However, if reliability is sufficiently high across studies, and variability among reliability scores is low, we gain considerable confidence in the reliability of future scores obtained with that particular measure. Reliability Generalization (RG: Vacha-Haase, 1998) is a meta-analytic technique to examine the range of reliability scores that have appeared in the literature, and to compute an estimated mean reliability across these studies. Furthermore, this technique can be used to examine whether these reliability scores are related to characteristics of the sample under investigation, such as the age, gender, and cultural background of the participants.

In Chapters 6 and 7, we examine whether the items as well as the underlying concepts of the LACA are interpreted in the same way by different age, gender, and cultural groups. Establishing measurement invariance is important when researchers wish to make comparisons across different groups (Chen, 2007; Van de Schoot, Lugtig, & Hox, 2012). There are several levels of measurement invariance. At least metric invariance (i.e., equal factor loadings across groups) should be established when researchers wish to compare associations between variables across groups. When researchers aim to compare means across groups, at least scalar invariance (i.e., equal factor loadings and intercepts across groups) should be established. In **Chapter 6**, we examine measurement invariance across gender and age in a sample of Belgian adolescents. In **Chapter 7**, we examine measurement invariance across cultural groups in a sample of Belgian and Chinese adolescents.

2.3 Identifying vulnerable groups

Loneliness has been associated with several indicators of poorer well-being in people of all ages (e.g., Ernst & Cacioppo, 1999; Heinrich & Gullone, 2006; Holt-Lunstad et al., 2015). It is therefore important to identify subgroups at potential risk for experiencing loneliness. When such subgroups can be distinguished, prevention and intervention programs can be

directed at these subgroups and tailored to their specific needs. Two factors that may pose adolescents at risk for loneliness have been examined in multiple studies, with inconsistent results. The present dissertation aims to move the field of loneliness research further by clarifying the role of health status (i.e., having a chronic physical condition) and gender in loneliness. Meta-analysis is the technique most suitable to address this objective, as it can be used to synthesize previous findings, allowing us to draw conclusions that go beyond individual studies. Specifically, a mean effect across studies conducted so far can be calculated, indicating for instance whether gender differences in loneliness exist. Moreover, a meta-analytic approach makes it possible to examine sample and study characteristics that may moderate this effect and that are often difficult to examine in individual empirical studies. For instance, it can be examined whether gender differences in loneliness vary according to loneliness type or across cultural groups.

In Part 3 of the present dissertation (i.e., Chapters 8 and 9), we examine factors that may pose individuals at risk for experiences of loneliness, using meta-analytic techniques. One group of children and adolescents that may be particularly likely to develop feelings of loneliness are children and adolescents with chronic physical conditions. This group has been found to be at risk for school absenteeism (Boekaerts & Roder, 1999), which may limit the time spend with peers. Furthermore, reduced energy levels, physical restrictions, or treatment-related responsibilities may prevent full participation in peer-related social activities for these children and adolescents (Martinez, Carter, & Legato, 2011; Pinquart & Teubert, 2012). These experiences may pose this group at risk for feelings of loneliness. However, empirical studies on this topic have yielded inconsistent results, with some studies finding higher levels of loneliness in this group (e.g., Curtin & Siegel, 2003; Storch et al., 2009) while others have not (e.g., Noll, Reiter-Purtill, Vannatta, Gerhardt, & Short, 2007; Storch et al., 2008). In **Chapter 8**, we examine whether children and adolescents with chronic physical conditions are lonelier than their peers without such conditions. Meta-analytic techniques will be used to synthesize the findings of previously conducted research.

Many researchers have examined gender differences in loneliness, but theoretical contentions are scarce and conflicting, and findings have been largely inconsistent (Weeks & Asher, 2012). One line of research suggests that females are lonelier than males. This hypothesis is derived from theoretical models of internalizing problems in general and depression in particular, and based on the assumption that loneliness can be categorized as an

internalizing problem. These models indicate that females often score higher than males in these domains and that this gender difference emerges during adolescence (Martel, 2013; Nolen-Hoeksema, 2001). To examine this hypothesis about changes in gender differences in loneliness over time, it is important to not only focus on adolescents, but also on the age groups preceding and following this developmental period. In addition to research suggesting that females are lonelier than males, other lines of research suggest that males are lonelier than females (e.g., Koenig & Abrams, 1999), or that there are no gender differences in loneliness (e.g., Cacioppo, Cacioppo, et al., 2015). It is important to examine gender differences in loneliness, because when we let our prejudices influence us, it means the group we view as less lonely risks receiving less recognition and treatment by professionals (Borys & Perlman, 1985). A meta-analysis will be conducted in **Chapter 9**, to synthesize the available evidence on gender differences in loneliness across the lifespan.

3. Summarized Overview of the Present Dissertation

In the present dissertation, we primarily focus on loneliness in adolescence. Although research in this domain has shown substantial growth over the last decades, several questions remain unresolved. Throughout this introductory chapter, we have briefly described three understudied topics. These topics and the corresponding studies and findings will be further described in the three parts of the present dissertation, which comprises eight chapters in total (see Figure 1.1). In Part 1 (i.e., Chapters 2, 3, and 4), we examine whether different types of loneliness can be distinguished. In Part 2 (i.e., Chapters 5, 6, and 7), we investigate psychometric characteristics of a multidimensional loneliness measure. In Part 3 (i.e., Chapters 8 and 9), we identify groups that may be especially vulnerable to experiences of loneliness. We end the present dissertation with a concluding chapter, in which we discuss our results in light of contemporary research and suggest avenues for future research.

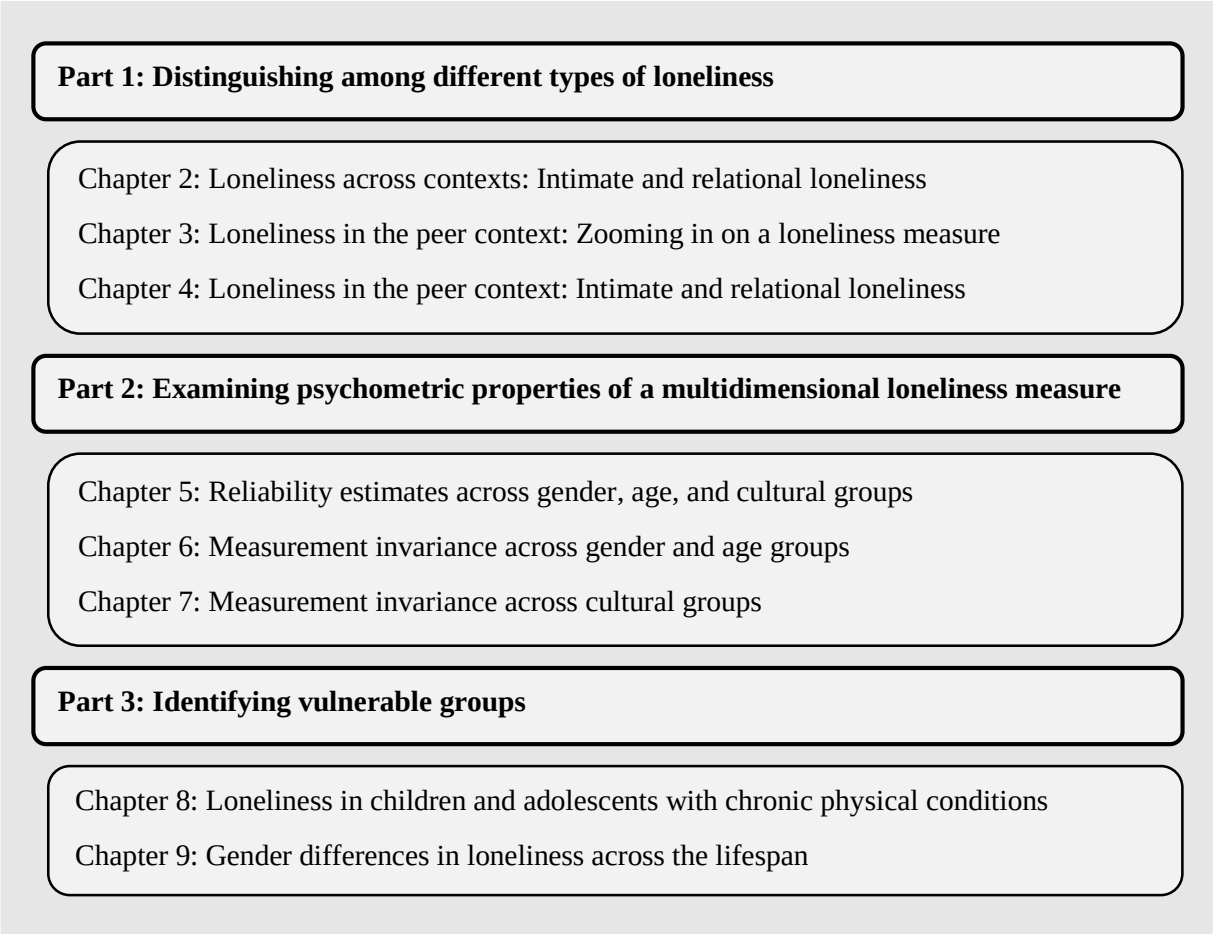


Figure 1.1. Structure of the present dissertation.

Part 1

Distinguishing Among Different Types of Loneliness

Let me tell you this: If you meet a loner, no matter what they tell you, it's not because they enjoy solitude. It's because they have tried to blend into the world before, and people continue to disappoint them.

(Jodi Picoult, My Sister's Keeper)

2

Loneliness Across Contexts:

Intimate and Relational Loneliness

Maes, M., Vanhalst, J., Spithoven, A. W. M., Van den Noortgate, W., & Goossens, L. (2016). Loneliness and attitudes toward aloneness in adolescence: A person-centered approach. *Journal of Youth and Adolescence, 45,* 547-567. doi:10.1007/s10964-015-0354-5

Abstract

In adolescence, feeling lonely and dealing with time spent alone become particularly salient. The present study examined the co-occurrence of parent- and peer-related loneliness, and positive and negative attitudes toward aloneness, using cluster analysis. In three independent samples, covering about 1,800 adolescents (61% female), six meaningful groups were identified. These groups showed different associations with adolescents' self-esteem and personality, parental responsiveness and psychological control, and peer group functioning and friendships. An adaptive pattern of correlates was found for adolescents in three of the six groups, that is, the Indifference group (with rather low scores on the four constructs), the Moderate group (with moderate scores on the four constructs), and the Negative Attitude Toward Aloneness group. A rather maladaptive pattern of correlates was found for adolescents in the three other groups, that is, the Peer-Related Loneliness group, the Positive Attitude Toward Aloneness group, and the Parent-Related Loneliness group. More specifically, adolescents in the Peer-Related Loneliness and Positive Attitude Toward Aloneness groups may need assistance regarding their relations with their peers, whereas adolescents in the Parent-Related Loneliness group may need assistance regarding their relations with their parents. Implications of these findings for current understanding and optimal measurement of adolescents' loneliness and aloneness are discussed.

1. Introduction

Feeling lonely and dealing with time spent alone are experiences that occur throughout the life span. Those experiences, however, become particularly salient in adolescence, when many changes in cognitive abilities and social relationships occur (Qualter et al., 2015; Majorano, Musetti, Brondino, & Corsano, 2015). Compared to children, adolescents spend an increasing amount of time on their own, and feeling lonely is a common experience in this period of life (Larson, 1997; Long & Averill, 2003; Qualter et al., 2015). People may feel lonely when alone, but also when they are surrounded by other people. Thus, loneliness is different from aloneness, that is, the objective experience of being without company (Long & Averill, 2003). More specifically, loneliness is an unpleasant experience that occurs when people perceive their social relations to be deficient, either quantitatively or qualitatively (Hawkley & Capitanio, 2015; Perlman & Peplau, 1981). Feelings of loneliness arise to signal to people that there is something missing in their social relationships and to motivate them to reconnect again. According to this *evolutionary theory of loneliness* (Cacioppo et al., 2015), a person who feels lonely also feels unsafe, and a survival mechanism is activated that heightens sensitivity to threats, which is accompanied by a host of negative feelings, including stress and low self-esteem (Hawkley & Cacioppo, 2010).

Adolescents may feel lonely in certain relationships (e.g., their parents), but not in others (e.g., their peers), and may have more or less negative or positive attitudes toward aloneness. To examine these relation-specific types of loneliness and attitudes toward aloneness, hybrid multidimensional models have been developed and used in the literature (Goossens et al., 2009; Houghton et al., 2014; Maes, Klimstra, Van den Noortgate, & Goossens, 2015; Majorano et al., 2015). The different types of loneliness and the different attitudes to aloneness can all be found to a certain degree within each individual, but their co-occurrence usually is not investigated as such. This study aims to identify groups of adolescents that share a similar pattern of scores across the different types of loneliness and attitudes toward being alone. In addition, we examine whether some of these groups are more vulnerable than others, in terms of adolescents' self-esteem and personality, parental responsiveness and psychological control, and peer group functioning and friendships.

1.1 Loneliness and aloneness in adolescence

Studying loneliness and attitudes toward aloneness is important during adolescence for different reasons. During this phase of life, social experiences change and so do adolescents' expectations about social interactions and their perceptions of what constitutes social isolation (Qualter et al., 2015). During adolescence, especially in Western cultures, the tension between social connection and individuation peaks (Larson, Richards, Moneta, Holmbeck, & Duckett, 1996). On the one hand, adolescents are expected to conform to the peer group and have close and intimate friends. On the other hand, gaining independence is a central developmental task in this phase of life. Adolescents may struggle to find a balance regarding this issue, which may lead to increased feelings of loneliness. A peak in loneliness has indeed been found in the adolescent years (Qualter et al., 2015). Furthermore, during adolescence, the relationships with parents and peers change. In early adolescence, parents occupy a central position in adolescents' personal network, but this position is gradually taken over by friends (Meeus & Deković, 1995). This transition, however, does not mean that adolescents do not need parental support anymore and both the parent and peer context remain important to the adolescent. In each relationship, adolescents may or may not feel lonely. That parent- and peer-related loneliness can be distinguished was also suggested by a recent meta-analysis that found a rather small average correlation between these two relation-specific types of loneliness (r = .22; Maes, Van den Noortgate, & Goossens, 2015).

Regarding attitudes toward aloneness, positive attitudes may be expected to emerge in adolescence, because time alone might be deliberately used, for example, for emotional self-regulation and identity development (Larson, 1997; Long & Averill, 2003). Research indeed found an increase in positive attitudes toward aloneness, accompanied by a decrease in negative attitudes from early adolescence onwards (Marcoen & Goossens, 1993; Marcoen, Goossens, & Caes, 1987). Positive attitudes toward aloneness, however, may also lead to excessive time alone, which in turn may increase feelings of loneliness when adolescents miss important opportunities for social interactions (Wang, Rubin, Laursen, Booth-LaForce, & Rose-Krasnor, 2013). Positive and negative attitudes toward aloneness are not two opposite ends of the same continuum, as is confirmed by a recent meta-analysis showing a very small average correlation between the two (r = -.02; Maes, Van den Noortgate et al., 2015).

1.2 Correlates of loneliness and attitudes toward aloneness

Bronfenbrenner's (1977) ecological model of human development already highlighted that it is important to look not only at adolescents' personal characteristics, but also at the context these adolescents live in. Two key interpersonal contexts for adolescents are the parent and peer contexts. The *social needs perspective* emphasizes that different social relationships may fulfill different social needs (Weiss, 1973). Weiss distinguished different types of provisions that may be offered by different relationships, such as attachment, social integration, reassurance of worth, and guidance. Whereas certain provisions may be offered by adolescents' relationships with both parents and peers (e.g., assurance of worth), other provisions may be offered particularly parent but not by peers (e.g., guidance), or by peers but not by parents (e.g., social integration). Therefore, a lack of certain provisions may result in parent-related loneliness or parent-related loneliness only. In addition, within the peer context, different types of peer relations exist, such as the larger peer group or dyadic friendships, both of which may also meet different needs (Ladd, Kochenderfer, & Coleman, 1997). Taken together, these models suggest that relation-specific types of loneliness are associated with difficulties in different domains. In the present study, therefore, we will associate loneliness and attitudes toward aloneness with adolescents' personal characteristics (i.e., self-esteem and personality), the parental context (i.e., parental responsiveness and psychological control), and the peer context (i.e., peer group functioning and dyadic friendships).

Adolescents' self-esteem and personality. Two classes of personality characteristics can be distinguished (Asendorpf & Van Aken, 2003). Surface personality characteristics, such as self-esteem, are highly susceptible to environmental influences, whereas core personality characteristics, such as the Big Five, are more immune to these influences. Both surface and core personality characteristics have been found to be related to loneliness and attitudes toward aloneness. In line with the evolutionary theory of loneliness, many studies have found a strong negative relation between self-esteem and loneliness (Mahon, Yarcheski, Yarcheski, Cannella, & Hanks, 2006; Vanhalst, Luyckx, Scholte, Engels, & Goossens, 2013). This link between loneliness and social self-esteem is also suggested by the Sociometer Hypothesis (Leary, Tambor, Terdal, & Downs, 1995), which states that self-esteem functions as a subjective monitor that evaluates the extent to which an individual is included or excluded. Feelings of not being included (c.f., loneliness) are related with lower self-esteem. Research examining specific domains of self-esteem found that loneliness was related with self-esteem in the subdomains of

close friendships, romantic appeal, academic performance, and physical appearance (Cheng & Furnham, 2002; Grøholt, Ekeberg, Wichstrøm, & Haldorsen, 2005). Whether such associations are more pronounced for parent- or peer-related loneliness is as yet unclear. Regarding attitudes toward aloneness, negative relations with general self-esteem have been found for both negative and positive attitudes to being alone (Teppers, Luyckx, Vanhalst, Klimstra, & Goossens, 2014).

The Big Five personality characteristics refer to five major personality traits (Caspi, Roberts, & Shiner, 2005), including extraversion (i.e., the tendency to engage in social behaviors, and to experience frequent positive moods), agreeableness (i.e., an individual's sociability, empathy, and cooperativeness), conscientiousness (i.e., organizational and motivational aspects of a person's behavior), neuroticism (i.e., the inability to deal with negative emotions, also referred to as the opposite of emotional stability), and openness (i.e., the way an individual seeks for and deals with new information). Although personality characteristics are less closely related with the conceptual definition of loneliness, they have a strong intuitive appeal (Goossens, 2006). Certain personality traits may reduce social attractiveness, influence one's interactional behavior, or affect one's reactions to changes in social relationships (Peplau & Perlman, 1982). Interestingly, those associations seem to be different for parent- and peer-related loneliness, as well as for positive and negative attitudes toward being alone (Asendorpf & Van Aken, 2003; Teppers et al., 2013). For example, loneliness in relations with peers, but not parents, was associated with less extraversion and more openness to experience, whereas loneliness in relation to parents, but not peers, was related with lower conscientiousness. Further, lower agreeableness was associated with both peer- and parent-related loneliness (Teppers et al., 2013). Concerning the associations between personality and attitudes toward aloneness, extraversion was associated with less positive and more negative attitudes toward aloneness (Teppers et al., 2013). Negative attitude to being alone was further associated with lower agreeableness and conscientiousness, whereas positive attitudes were associated with lower emotional stability and higher openness to experience (Teppers et al., 2013).

Parental responsiveness and psychological control. Parents constitute an important interpersonal context for adolescents. Both positive (e.g., responsiveness) and negative (e.g., psychological control) parenting behaviors have been associated with loneliness (Mahon et al., 2006; Soenens, Vansteenkiste, Goossens, Duriez, & Niemiec, 2008). Only one study thus far has differentiated between relation-specific types of loneliness. This study, based on self-

reports, indicated that acceptance and child-centeredness (c.f., responsiveness) were negatively associated with parent-related loneliness, whereas psychological control was positively related with parent-related loneliness (Scharf, Wiseman, & Farah, 2011). The same patterns were found for peer-related loneliness, but the strength of the associations was lower. An explanation for these findings, inspired by attachment research (Kochanska & Kim, 2013; Pallini, Baiocco, Schneider, Madigan, & Atkinson, 2014), proposes that experiences with parents will give rise to internal working models, which might be generalized by adolescents to their relationships with peers (Cassidy & Berlin, 1999; Rotenberg, 1999; Scharf et al., 2011). Regarding attitudes toward aloneness, positive and negative attitudes were not related with parenting behaviors, except for a positive relation between psychological control and positive attitudes toward aloneness (Scharf et al., 2011).

Peer group functioning and friendships. In line with the social needs perspective (Weiss, 1973), loneliness has been associated with different types of peer relationships, including adolescents' functioning in the larger peer group and dyadic friendships (Ladd et al., 1997; Vanhalst, Luyckx, & Goossens, 2014). Research on the larger peer group, using peer nominations, found that adolescents' loneliness was associated with lower peer acceptance, more peer victimization, and higher levels of shyness, but was unrelated with peer-nominated aggression (Woodhouse, Dykas, & Cassidy, 2012). When differentiating among relation-specific types of loneliness, peer-, but not parent-, related loneliness has been found to be related with peer group functioning and friendships. For example, peer victimization was only associated with peer-related loneliness (Brighi, Guarini, Melotti, Galli, & Genta, 2012). Peer-related loneliness was further found to be negatively related with friendship quantity (Bowker & Spencer, 2010) and quality (Soenens et al., 2008; Vanhalst et al., 2014). The only study examining attitudes toward aloneness in the peer context found that negative attitudes were positively related with the quality of adolescents' peer relations (Corsano, Majorano, & Champretavy, 2006).

1.3 The present study

Although the knowledge base on adolescents' loneliness is expanding, studies on adolescents' attitudes toward aloneness are still rather scarce. Moreover, the majority of loneliness studies still adopts a unidimensional approach, while feelings of loneliness are likely relationship-specific. The present study, therefore, focuses on both positive and negative

attitudes toward aloneness and on two relation-specific types of loneliness, that is, parent- and peer-related loneliness. Furthermore, most studies have adopted a variable-centered approach and examined how loneliness and attitudes toward aloneness uniquely were related with other variables. However, parent- and peer-related loneliness, and negative and positive attitudes toward aloneness are all present to a certain extent in each individual. In this study, we therefore aimed to extend the current literature by adopting a person-centered approach. More specifically, we aimed to identify groups of adolescents with similar patterns of scores on parent- and peer-related loneliness and negative and positive attitudes toward aloneness. In addition, we aimed to examine whether these groups differed on adolescents' self-esteem and personality, on parental responsiveness and psychological control, and on peer group functioning and friendships. To this aim, we used a multi-informant approach, and included self-report questionnaires, parent-report questionnaires, and peer nominations. Cluster analysis is a technique that uses relations among different constructs to group units into clusters such that units in the same cluster are more alike than units that belong to different clusters (Gore, 2000). Given that cluster solutions may be highly sample-specific, we replicated the clusters in three independent samples, covering a total sample of about 1,800 adolescents.

Two previous studies conducted a cluster analysis on either of the two relation-specific types of loneliness or the two attitudes toward aloneness. The study focusing on loneliness found four meaningful clusters in two samples of adolescents (Vanhalst, Luyckx, & Goossens, 2010). These four clusters included a group of adolescents scoring high on both parent- and peer-related loneliness (14% of mid adolescents and 8% of late adolescents), low on both (44% of mid adolescents and 41% of late adolescents), high on parent-related loneliness (21% for both mid and late adolescents), and high on peer-related loneliness (21% of mid adolescents and 30% of late adolescents). The study focusing on attitudes toward aloneness found three meaningful clusters in two samples of adolescents. These three clusters included a group of adolescents scoring high on positive attitudes toward aloneness, high on negative attitudes toward aloneness, and low on both attitudes (Teppers et al., 2014). In both the mid and late adolescence sample, each cluster comprised about one third of the participants. Given that no previous research has used both loneliness and attitudes toward aloneness scores in such a person-centered analysis, the present study explored whether groups of adolescents can be identified that share similar patterns of scores regarding loneliness and attitudes toward aloneness.

When such groups of adolescents could be identified, we examined whether some of these groups had specific needs. More specifically, we examined which groups were most vulnerable regarding adolescents' self-esteem and personality, parental responsiveness and psychological control, and peer group functioning and friendships. The findings would then provide suggestions for specific interventions for these groups (e.g., strengthening personal resources, providing assistance regarding relationships with parents, or helping adolescents to build more satisfying relationships with peers). Based on previous, variable centered research, we expected less beneficial correlates for adolescents with high parent- or peer-related loneliness, or high scores on positive attitudes toward aloneness. We therefore expected that adolescents in clusters showing high scores on these variables would show less adaptive correlates. Specifically, we expected that a potential cluster of adolescents scoring high on parent-related loneliness would show the most maladaptive scores for parental responsiveness and psychological control, and that a potential cluster of adolescents scoring high on peer-related loneliness, would show the most maladaptive scores for peer group functioning and friendships.

2. Method

2.1 Participants

We conducted the analyses on three independent samples that each included the same loneliness measure but had a unique set of correlates. Data for *Sample 1* were collected in 2012 in three secondary schools to investigate loneliness in relation to surface (i.e., self-esteem) and core (i.e., Big Five) personality characteristics. This sample consisted of 266 adolescents (65.8% female) from Grade 11 and 12, aged 16 to 20 years (M = 16.56, SD = 0.72). Data on family composition was not available. Data for *Sample 2* were collected in 2010 in three secondary schools to examine loneliness in relation to parenting behaviors. This sample consisted of 660 adolescents (49.2% females) from Grade 9 to 12, aged 13 to 20 years (M = 15.78, SD = 1.30). Family composition was diverse, including intact families (81%), divorced parents (16%), and families in which at least one parent had deceased (2%). In this sample, parents filled out questionnaires on their parenting behavior. Parental participation was 57.2% for mothers and 49.0% for fathers. Mothers were 35 to 60 years old (M = 45.59, SD = 3.38) and fathers were 38 to 66 years old (M = 47.39, SD = 3.90). Data for *Sample 3* were collected in 2009 in three secondary schools, as part of a larger study examining the developmental trend of loneliness

across adolescence, its antecedents, and consequences (including peer group functioning). This sample consisted of 904 adolescents (67.7% females) from Grade 9 to 12, aged 13 to 21 years (M = 15.79, SD = 1.33). Family composition was diverse, including intact families (71%), divorced parents (26%), and families in which at least one parent had deceased (3%). All of these nine secondary schools are located in the Dutch-speaking part of Belgium and are known to attract mainly Caucasian students from middle class backgrounds.

Questionnaires were administered in the classroom and anonymity was guaranteed. On the day of testing, adolescents could revoke consent at any time. Parents were informed about the study and could revoke consent for the participation of their child (less than 1% in each sample). The Institutional Review Board approved all study procedures.

2.2 Measures

Loneliness. To measure loneliness and attitudes toward being alone, the Loneliness and Aloneness Scale for Children and Adolescents (LACA; Marcoen et al., 1987) was administered in all three samples. This 48-item scale comprised four subscales of 12 items each, measuring parent- and peer-related loneliness and negative and positive attitudes toward aloneness. Participants answered each item on a 4-point Likert-type scale ranging from (1) *often* to (4) *never*. The LACA was originally developed in Belgium, but has been adapted and translated in numerous languages, including Arabic, Chinese, English, French, Greek, Hebrew, Italian, Spanish, and Portuguese. The four-factor structure of the LACA showed superior fit to alternative models and measurement invariance across gender and age (Maes, Klimstra et al., 2015). Previous research further found good reliability (i.e., Cronbach's alpha > .80) for the four subscales across a broad range of samples (Maes, Van den Noortgate et al., 2015) and high stability over a 3-month period (median r = .78; Goossens, 2016). In the present study, reliability scores were also good in all three samples for parent-related loneliness (e.g., "I feel left out by my parents"; Cronbach's α = .90-.92), peer-related loneliness (e.g., "I feel sad because I have no friends"; α = .87-.89), negative attitudes toward aloneness (e.g., "When I am alone, I feel bad" ; α = .81-.83), and positive attitudes toward aloneness (e.g., "I want to be alone" ; α = .82-.86).

Self-esteem. Adolescents' self-esteem was measured in Sample 1 with the Self-Perception Profile for Adolescents (Harter, 1985), using a Likert-type answer format that is less time-consuming, showed similar discriminant validity, and better reliability and convergent

validity than the original format (Wichstrøm, 1995). We included the Global Self-Worth subscale (e.g., "I am pretty pleased with myself" ; α = .84) as well as seven specific domains, that is, Scholastic Competence (e.g., "I am pretty slow in finishing my school work" ; α = .67), Social Competence (e.g., "I find it hard to make friends" ; α = .77), Athletic Competence (e.g., "I do very well at all kinds of sports" ; α = 91), Physical Appearance (e.g., "I am not happy with the way I look" ; α = .86), Romantic Appeal (e.g., "I feel that if I am romantically interested in someone, that person will like me back" ; α = .65), Behavioral Conduct (e.g., "I do things I know I shouldn't do" ; α = .59), and Close Friendship (e.g., "I am able to make really close friends" ; α = .56). Each subscale consisted of 5 items, which were answered on a 4-point scale ranging from (1) *describes me very poorly* to (4) *describes me very well*. The subscale Close Friendship consisted of 4 items. We excluded the item "I can share secrets with my friends", because of its low item-rest correlation.

Big Five personality characteristics. In Sample l, the Quick Big Five (Goldberg, 1992) assessed the five personality domains using 30 items. The Dutch version (Vermulst & Gerris, 2005) was reliable in previous research and showed good convergent and divergent validity. On a 7-point Likert-type scale ranging from (1) *completely untrue* to (7) *completely true*, participants indicated whether they felt they had certain characteristics such as "talkative" (Extraversion; α = .85), "sympathetic" (Agreeableness; α = .80), "systematic" (Conscientiousness; α = .91), "worried" (Neuroticism; α = .87), and "creative" (Openness; α = .84).

Parental responsiveness. Parental responsiveness was measured in Sample 2 from adolescent, mother, and father perspectives, using 7 items from the Child Report of Parent Behavior Inventory (CRPBI; Schaefer, 1965). The Dutch version was found to be reliable and valid in previous research (Delhaye, Beyers, Klimstra, Linkowskki, & Goossens, 2012). Regarding the adolescents' perspective (e.g., "My mother / father makes me feel better after talking about my worries with her / him"), Cronbach's α's were .91 (mothers' responsiveness) and .92 (fathers' responsiveness). Regarding the parents' perspective, the items were revised slightly so that parents could report on their own parenting behavior toward their child (e.g., "I make my son / daughter feel better after talking about his / her worries with me"). Cronbach's α's were .80 (mothers' responsiveness) and .85 (fathers' responsiveness). All items were answered on a 5-point Likert-type scale ranging from (1) *completely untrue* to (5) *completely true*.

Parental psychological control. Parental psychological control was assessed in Sample 2 from adolescent, mother, and father perspectives, using the 8-item Psychological Control Scale – Youth Self-Report (PRS – YSR; Barber, 1996). The validity of this scale has been established in previous research (Barber, Xia, Olsen, McNeely, & Bose, 2012). Regarding the adolescents' perspective (e.g., "My mother / father is always trying to change how I feel or think about things"), Cronbach's α's were .83 (mothers' psychological control) and .77 (fathers' psychological control). Regarding the parents' perspective, the items were revised slightly so that parents could report on their own parenting behavior (e.g., "I try to change how my son / daughter feels or thinks about things"). Cronbach's α's were .75 (mothers' psychological control) and .85 (fathers' psychological control). All items could be answered on a 5-point Likert-type scale ranging from (1) *completely untrue* to (5) *completely true.*

Peer nominations. In Sample 3, participants received an alphabetical list of names of their classmates preceded by a number. For each of the six nomination items, they were asked to consider whom of their classmates fit the description and to write down their corresponding number from the alphabetical list, starting with the number of the peer who fit the description best. An unlimited number of nominations could be given. For each of the items described below, we summed received nominations for each individual and standardized within class. A recent meta-analysis on several dimensions of sociometric status, that is, acceptance, rejection, social preference, and peer ratings, showed good test-retest reliability of these measures (Jiang & Cillessen, 2005).

Two peer nomination items were used to capture social acceptance. To probe for likability, participants were asked: "Which people in your class do you like the most?". To probe for dislikability, participants were asked: "Which people in you class do you like the least?" Peer nominations were also used to calculate a shyness score. Participants were asked: "Which people in your class are shy and/or socially withdrawn?". To probe for aggression, participants were asked to nominate classmates that fit the following description: "Which people in your class are aggressive?". Two peer nominations were used to capture peer victimization and bullying. To probe for victimization, participants were asked: "Which people in you class are victimized?". To probe for bullying, participants were asked: "Which people in your class are bullying others?". A clear definition of victimization was added (see Vanhalst et al., 2014): "By victimization, we mean that someone is mean to someone else, or when that person is threatened, locked up, or kicked. It is called victimization if it happens regularly and

if it is difficult for the victim to defend him/herself. It is also called victimization if someone is teased often in a mean way. It is not victimization if two people are about equally strong and they argue, fight, or tease one another" (Olweus, 1989).

Friendship quantity. Friendship quantity was assessed in Sample 3 using the peer nomination item "Which people in you class are your best friends?". For each participant, the first five nominations were used to calculate the number of reciprocal friendships (i.e., when the participants nominated a classmate who also nominated that specific participant as a best friend).

Friendship quality. Negative and positive friendship quality were measured in Sample 3. First, participants were asked to concentrate on their best friend. Next, they were asked to keep this best friend in mind while filling out the Friendship Qualities Scale, which has shown good validity (FQS; Bukowski, Hoza, & Boivin, 1994; Furman, 1996). Negative friendship quality was measured with the 4-item subscale Conflict (e.g., "My friend and I can argue a lot"; $\alpha = .72$). Positive friendship quality was measured with 19 items (e.g., "I feel happy when I am with my friend"; $\alpha = .91$) by merging the subscales Companionship, Help, Security, and Closeness. Participants answered each item on a 5-point Likert-type scale ranging from (1*) does not apply to me at all* to (5) *applies to me very well*.

2.3 Statistical analyses

Before conducting the main analyses, we examined the correlations among the study variables for the three samples separately. We used Cohen's (1988) benchmarks and regarded correlations of .20 as small, correlations of .30 as moderate, and correlations of .50 as large. Next, using cluster analysis for each sample separately, we aimed to group participants into clusters such that participants within a cluster are more alike than participants from different clusters. Before conducting the cluster analyses, we removed the data of participants with missings on the LACA subscales, univariate outliers (i.e., values more than 3 SD below or above the mean), and multivariate outliers (i.e., Mahalanobis distance values greater than 18.46; Tabachnick, Fidell, & Osterlind, 2001). In each sample, we conducted the cluster analysis on the remaining adolescents using a two-step procedure (Gore, 2000). First, hierarchical cluster analysis was carried out using Ward's method on squared Euclidian distances. Based on parsimony, interpretability, and explanatory power (i.e., the cluster solution had to explain at least 45% of the variance in each of the constituting dimensions), the number of clusters was

determined. A disadvantage of Ward's method is that when participants are grouped into a cluster, they will remain in that cluster in all subsequent steps, which may result in nonoptimal solutions. Therefore, an additional iterative procedure was included in the second step to optimize the cluster solution and to minimize within-cluster differences. The k-means method was used, using Ward's initial cluster centers as non-random starting points.

The stability of the final cluster solutions was examined by cross-validating within and between samples. First, each sample was randomly spit into halves. The two-step procedure (i.e., Ward followed by *k*-means) was applied to each half. The final cluster centers obtained for one half of the sample were then used to classify the participants of the other half. Cohen's kappa (κ) was used to examine the overlap of these new clusters with the original clusters (Breckenridge, 2000). The two resulting kappas (one for the first half of the sample, the other for the other half) were averaged. An agreement of at least .60 is considered acceptable (Asendorpf, Borkenau, Ostendorf, & Van Aken, 2001). Second, we cross-validated the clusters between samples by using the final centers of one sample to classify the participants of another sample, and by comparing this new classification with the original classification. The two resulting kappas were again averaged.

Grade and gender differences across the resulting clusters were tested, but were expected to be small. To examine which groups of adolescents were most vulnerable, we conducted a multivariate analysis of variance (MANOVA) on each sample. For Sample 1, adolescents' self-esteem and personality were examined. For Sample 2 and 3, we examined parenting and adolescents' peer group functioning and friendships, respectively. Subsequent univariate ANOVAs and post-hoc comparisons, based on Tukey HSD tests to control for Type I error, were used to examine which groups of adolescents differed on which outcome variables. For each ANOVA we report an effect size, that is, partial eta-squared. We used Cohen's (1988) benchmarks and regarded an effect size of .01 as small, of .06 as moderate, and of .14 as large.

3. Results

3.1 Preliminary correlational analyses

The correlations among the different variables in the respective samples can be found in Tables 2.1 to 2.3. The correlations among the subscales of the LACA can be found in all three tables, because this measure was used in each of the samples. Across the samples, small correlations were found between parent- and peer-related loneliness (*r* ranging from .10 to .20),

which supports the distinction between these two relation-specific types of loneliness. Small correlations were also found between negative and positive attitudes toward aloneness (*r* ranging from -.14 to .03), suggesting that these variables are not two opposite ends of the same continuum. The correlation between peer-related loneliness and positive attitudes toward aloneness was consistently moderate (*r* ranging from .40 to .44). The other correlations among the LACA subscales were all small (i.e., *r*s < .20).

Associations of the LACA subscales with adolescents' self-esteem and personality are presented in Table 2.1. The LACA subscales, except for the negative attitude to aloneness, were moderately and negatively related with self-esteem. Further, Agreeableness and Emotional stability were weakly to moderately and negatively related with all four LACA subscales. Conscientiousness was moderately related with parent-related loneliness only. Extraversion was not related with negative attitudes toward aloneness, but was moderately to strongly and negatively related with the three other subscales. Openness to experience was not related with loneliness, and weakly related with negative and positive attitudes toward aloneness

Associations between the LACA subscales and parental responsiveness and psychological control are presented in Table 2.2. Parent-related loneliness was negatively related with parents' responsiveness and positively with parents' psychological control. These correlations were large when reported by the adolescents. A similar pattern was observed for the three other subscales, although correlations were small (adolescents' perspective) or non-significant (parents' perspective).

Associations between the LACA subscales and adolescents' peer group functioning and friendships are presented in Table 2.3. Peer-, but not parent-related loneliness and negative, but not positive attitude toward aloneness, were weakly to moderately related with both likability and dislikability. Peer-related loneliness was further moderately and positively related with shyness and victimization and weakly and negatively with bullying. Parent-related loneliness was weakly and positively related with aggression and bullying. Friendship quantity and quality were negatively related with peer-related loneliness and positive attitudes, and positively with negative attitudes toward aloneness. Conflict was positively related with peer-related loneliness and negative attitudes toward aloneness. These relations with peer-related loneliness were moderate in size, whereas the others were generally weak in size.

Table 2.1

Descriptive Statistics of and Correlations Among Variables Related to Adolescents' Self (Sample 1)

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Loneliness																		
1. Parent related loneliness	1.71	0.52	-															
2. Peer related loneliness	1.62	0.48	.20**	-														
3. Aversion to being alone	2.63	0.41	-.07	.10	-													
4. Affinity for being alone	2.59	0.48	.20**	.42***	-.14*	-												
Self-esteem																		
5. Global self-esteem	2.93	0.61	-.35***	-.46***	-.13*	-.28***	-											
6. Scholastic competence	2.75	0.51	-.18**	-.20**	.04	-.14*	.37***	-										
7. Social competence	2.97	0.50	-.20**	-.65***	.15*	-.31***	.46***	.25***	-									
8. Athletic competence	2.48	0.86	-.08	-.30***	.03	-.26***	.24***	.12	.43***	-								
9. Physical appearance	2.61	0.64	-.29***	-.32***	-.11	-.11	.69***	.26***	.42***	.34***	-							
10. Romantic appeal	2.59	0.52	-.09	-.40***	.10	-.14*	.37***	.20**	.57***	.38***	.48***	-						
11. Behavioral conduct	2.67	0.45	-.29***	-.09	-.11	-.02	.35***	.27***	.08	.00	.15*	-.10	-					
12. Close friendship	3.11	0.54	-.15	-.66***	.18**	-.39***	.36***	.21***	.58***	.29***	.27***	.39***	.03	-				
Personality																		
13. Agreeableness	5.43	0.65	-.18**	-.15*	.23***	-.12	.12	.06	.36***	.10	.08	.14*	.13*	.27***	-			
14. Conscientiousness	3.93	1.29	-.27***	.03	-.01	-.03	-.01	.06	.10	.07	.01	-.04	.30***	-.08	.17**	-		
15. Extraversion	4.64	1.27	-.17**	-.51***	.09	-.34***	.36***	.31***	.67***	.30***	.26***	.46***	-.09	.43***	.19**	-.06	-	
16. Emotional stability	3.80	1.05	-.12	-.34***	-.17**	-.20**	.43***	.31***	.26***	.20**	.39***	.23***	.23***	.25***	-.07	-.10	.36***	-
17. Openness to experience	4.59	0.92	.03	-.02	-.15*	.18**	.16*	.13*	.07	-.01	.19**	.17**	-.09	.07	.09	-.07	.13*	.07

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2.2

Descriptive Statistics of and Correlations Among Variables Related to Adolescents' Parents (Sample 2)

Variable	*M*	*SD*	1	2	3	4	8	9	10	11	12	13	14
Loneliness													
1. Parent related loneliness	1.68	0.50	-										
2. Peer related loneliness	1.54	0.45	.10*	-									
3. Aversion to being alone	2.41	0.44	.04	.12**	-								
4. Affinity for being alone	2.44	0.49	.06	.44***	.01	-							
Parenting: Adolescent perspective													
8. Responsiveness mother	4.00	0.79	-.70***	-.10*	.05	-.02	-						
9. Psychological control mother	2.14	0.74	.47***	.16***	.11**	.11**	-.50***	-					
10. Responsiveness father	3.48	0.90	-.58***	-.14***	-.04	-.08*	.36***	-.12**	-				
11. Psychological control father	2.24	0.72	.41***	.17***	.12**	.11**	-.18***	.42***	-.47***	-			
Parenting: Mother perspective													
12. Responsiveness mother	4.38	0.49	-.22***	-.07	-.01	-.07	.25***	-.12*	.18**	-.05	-		
13. Psychological control mother	2.09	0.62	.17***	-.06	.07	-.01	-.20***	.21***	-.07	.03	-.36***	-	
Parenting: Father perspective													
14. Responsiveness father	4.01	0.61	-.23***	-.11	-.01	-.11	.18**	-.13*	.37***	-.19***	.25***	-.12*	-
15. Psychological control father	2.13	0.59	.10	-.07	.01	-.08	-.06	.06	-.14*	.22***	-.10	.13*	-.42***

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2.3

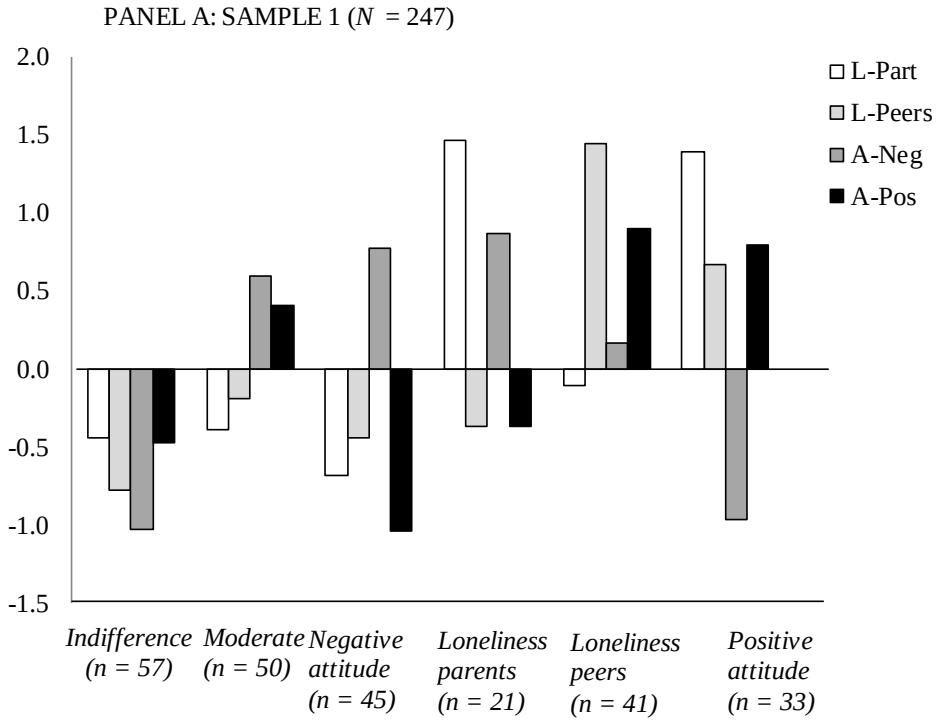
Descriptive Statistics of and Correlations Among Variables Related to Adolescent's Peers (Sample 3)

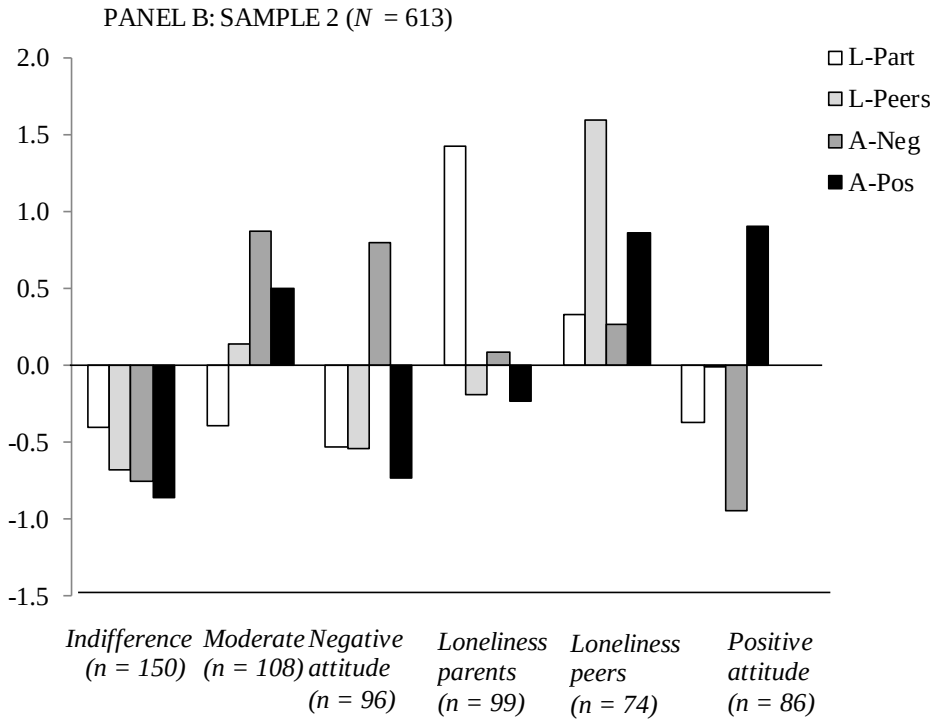
Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12
Loneliness														
1. Parent related loneliness	1.76	0.56	-											
2. Peer related loneliness	1.64	0.51	.19***	-										
3. Aversion to being alone	2.49	0.47	.15***	.14***	-									
4. Affinity for being alone	2.49	0.52	.16***	.40***	.03	-								
Peer nominations														
5. Likability	0.06	0.98	-.04	-.20***	.10**	-.06	-							
6. Dislikability	-0.02	0.97	.05	.18***	-.08*	.03	-.45***	-						
7. Shyness	0.00	0.97	-.08*	.28***	-.08*	.11**	-.35***	.29***	-					
8. Aggression	-0.03	0.95	.13***	-.05	-.03	-.04	-.09**	.27***	-.18***	-				
9. Victimization	-0.01	0.98	-.01	.25***	-.08*	.06	-.34***	.55***	.32***	.04	-			
10. Bullying	-0.04	0.94	.12***	-.13***	-.03	-.05	-.04	.28***	-.19***	.63***	-.03	-		
Friendships														
11. Friendship quantity	2.01	1.36	-.09**	-.25***	.12***	-.11**	.52***	-.31***	-.23***	-.07*	-.24***	.01	-	
12. Negative quality	2.24	0.75	.15***	.18***	.05	.19***	.00	-.03	-.05	.03	-.03	.01	-.04	-
13. Positive quality	4.20	0.51	-.10**	-.33***	.18***	-.16***	.14***	-.10**	-.15***	-.01	-.13***	-.02	.12***	-.24***

* $p < .05$. ** $p < .01$. *** $p < .001$.

3.2 Cluster analysis of loneliness and attitudes toward being alone

To find groups of adolescents with similar scores on parent- and peer-related loneliness and negative and positive attitudes toward aloneness, we conducted a cluster analysis. For the three samples, we removed participants with missing data (i.e., 12, 31, and 12 participants, respectively), univariate outliers (i.e., 7, 15, and 21 participants, respectively) and multivariate outliers (i.e., 0, 1, and 4 participants, respectively). Cluster analyses on the remaining adolescents revealed a six-cluster solution in all three samples (Figure 2.1, Panels A to C), explaining 51-62% of the variance in parent-related loneliness, 54-59% in peer-related loneliness, 53-61% in negative attitudes, and 51-57% in positive attitudes toward aloneness. Cross-validation within samples resulted in adequate kappas of .71 (Sample 1), .71 (Sample 2), and .67 (Sample 3). Cross-validation between samples resulted in equally adequate kappas of .67 (Sample 1), .67 (Sample 2), and .74 (Sample 3).





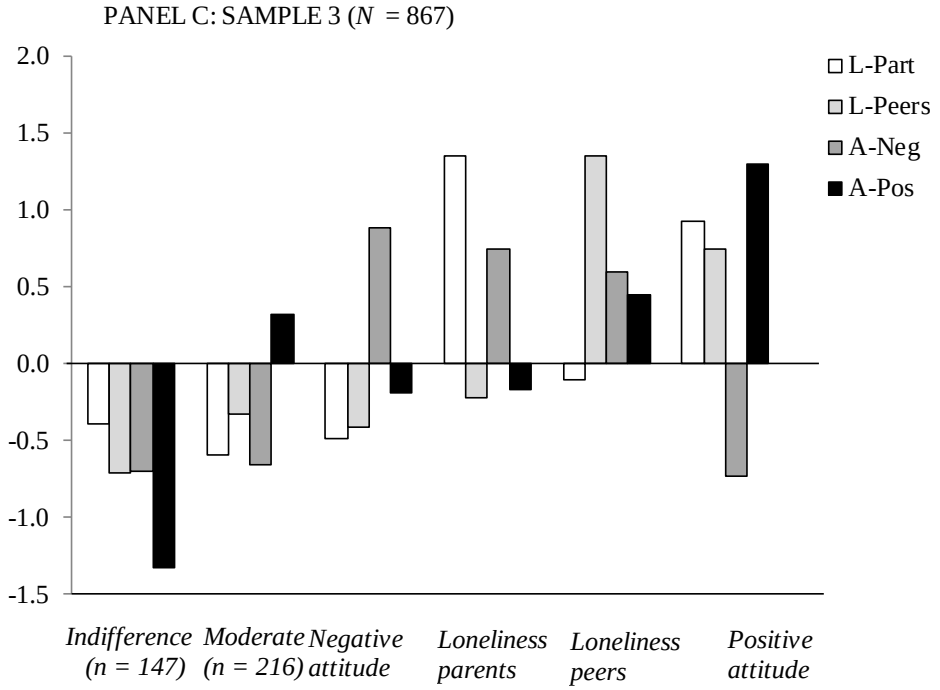


Figure 2.1. Final six-cluster solution based on Z-scores for parent-related loneliness (L-Part), peer-related loneliness (L-Peers), aversion to being alone (A-Neg), and affinity for being alone (A-Pos). Panels A to C represent cluster solutions of the three individual samples.

The *Indifference* cluster (17-23% of the sample) consisted of adolescents scoring moderately low on parent-related loneliness and low on peer-related loneliness and attitudes toward aloneness. The *Moderate* cluster (18-25%), was characterized by moderately low parent-related loneliness, average peer-related loneliness, and moderately high attitudes toward aloneness. A variation on this pattern emerged in Sample 3, where adolescents scored moderately low on negative attitudes toward aloneness. The *Negative Attitude* cluster (16-21%) consisted of adolescents with high scores on negative attitudes toward aloneness and low scores on positive attitudes. For parent- and peer-related loneliness, moderately low scores were found. A variation on this pattern emerged in Sample 3, where adolescents had average scores on positive attitudes toward aloneness. The *Parent-Related Loneliness* cluster (9-16%) was characterized by high parent-, but not peer-related loneliness. Adolescents in this cluster were further characterized by high negative attitudes and average positive attitudes toward aloneness. A variation on this pattern emerged in Sample 2, where adolescents showed average negative attitudes toward aloneness. The *Peer-Related Loneliness* cluster (12-19%) was characterized by high peer-, but not parent-related loneliness. Adolescents in this cluster were further characterized by average negative attitudes and high positive attitudes toward aloneness. A variation on this pattern emerged in Sample 3, where adolescents showed moderately high negative and positive attitudes toward aloneness. The *Positive Attitude* cluster (10-14%) consisted of adolescents scoring high on positive attitudes and low on negative attitudes toward aloneness. Adolescents in this cluster further showed moderately high parent- and peer-related loneliness. A variation on this pattern emerged in Sample 2 where the adolescents showed average parent- and peer-related loneliness. The variations on the cluster patterns presumably reflected specific characteristics of the samples. Aggregating the results of the three samples is a useful method for carving out consistencies (Asendorpf et al., 2001). Figure 2.2 shows the mean pattern across the three samples for the obtained clusters.

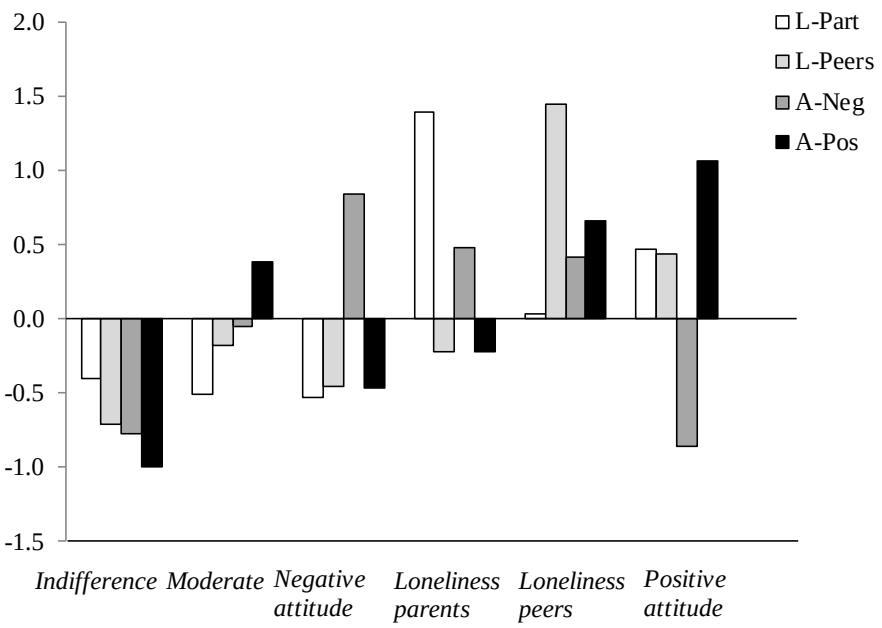


Figure 2.2. Overall cluster solution, aggregated across the three samples, based on Z-scores for parent-related loneliness (L-Part), peer-related loneliness (L-Peers), aversion to being alone (A-Neg), and affinity for being alone (A-Pos).

We further tested whether the clusters differed in gender and grade distribution. Some gender and grade differences were found, but, as expected, effect sizes were small. For Sample 1, we found differences in gender distribution ($\chi^2(5) = 13.00$, $p = .02$, $\varphi = .22$), but not in grade distribution ($\chi^2(5) = 8.75$, $p = .12$, $\varphi = .18$). More boys were found in the Indifference cluster. For Sample 2, we also found gender ($\chi^2(5) = 15.19$, $p = .01$, $\varphi = .15$) and grade ($\chi^2(15) = 43.82$, $p < .001$, $\varphi = .25$) differences. More boys were found in the Indifference cluster and fewer boys in the Moderate cluster. Further, fewer adolescents from Grade 9 and more adolescents from Grade 12 were found in the Positive Attitude cluster. For Sample 3, we found differences in both gender ($\chi^2(5) = 29.10$, $p < .001$, $\varphi = .18$) and grade ($\chi^2(15) = 29.18$, $p = .02$, $\varphi = .18$) distributions. More boys were found in the Indifference cluster and fewer boys in the Negative Attitude cluster. Further, more adolescents from Grade 9 were found in the Indifference cluster and fewer adolescents from Grade 9 in the Peer-Related Loneliness cluster.

Table 2.4

Univariate ANOVAs and Post-hoc Cluster Comparisons Based on Tukey HSD Tests (Sample 1)

	Indifference		Moderate		Negative attitude		Loneliness parents		Loneliness peers		Positive attitude			
Variable	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	*F* (5,235)	η²
Self-esteem														
Global self-esteem	3.32 ^{c}	(0.42)	2.96 ^{b,c}	(0.58)	3.05 ^{b,c}	(0.49)	2.87 ^{a,b}	(0.56)	2.52 ^{a}	(0.58)	2.61 ^{a}	(0.67)	13.23***	0.22
Scholastic competence	2.81 ^{b}	(0.56)	2.81 ^{a,b}	(0.39)	2.87 ^{b}	(0.44)	2.81 ^{a,b}	(0.46)	2.58 ^{a,b}	(0.52)	2.58 ^{a}	(0.63)	2.52*	0.05
Social competence	3.19 ^{b}	(0.40)	3.06 ^{b}	(0.35)	3.21 ^{b}	(0.34)	3.23 ^{b}	(0.36)	2.45 ^{a}	(0.44)	2.64 ^{a}	(0.55)	25.75***	0.35
Athletic competence	2.77 ^{b}	(0.78)	2.38 ^{a,b}	(0.90)	2.71 ^{b}	(0.83)	2.61 ^{b}	(0.79)	2.06 ^{a}	(0.82)	2.20 ^{a}	(0.82)	5.11***	0.10
Physical appearance	2.97 ^{b}	(0.51)	2.60 ^{a,b}	(0.53)	2.66 ^{a,b}	(0.63)	2.44 ^{a}	(0.79)	2.41 ^{a}	(0.62)	2.31 ^{a}	(0.70)	6.80***	0.13
Romantic appeal	2.69 ^{b}	(0.48)	2.61 ^{b}	(0.47)	2.75 ^{b}	(0.45)	2.80 ^{b}	(0.58)	2.26 ^{a}	(0.47)	2.39 ^{a,b}	(0.55)	6.99***	0.13
Behavioral conduct	2.78	(0.50)	2.70	(0.46)	2.65	(0.42)	2.47	(0.45)	2.72	(0.41)	2.55	(0.42)	2.07	0.04
Close friendship	3.34 ^{b}	(0.43)	3.19 ^{b}	(0.32)	3.31 ^{b}	(0.39)	3.50 ^{b}	(0.29)	2.61 ^{a}	(0.49)	2.64 ^{a}	(0.63)	25.98***	0.36
Personality														
Agreeableness	5.51 ^{a,b}	(0.67)	5.51 ^{b}	(0.56)	5.60 ^{a,b}	(0.56)	5.60 ^{a,b}	(0.77)	5.31 ^{a,b}	(0.64)	5.04 ^{a}	(0.63)	4.12**	0.08
Conscientiousness	4.15 ^{b}	(1.36)	4.31 ^{b}	(1.18)	3.88 ^{a,b}	(1.27)	3.19 ^{a}	(1.48)	4.03 ^{b}	(1.11)	3.52 ^{a}	(1.25)	3.31**	0.07
Extraversion	5.06 ^{c,d}	(1.33)	4.55 ^{b,c}	(0.95)	5.33 ^{d}	(0.79)	5.20 ^{c,d}	(0.93)	3.64 ^{a}	(1.11)	3.95 ^{a,b}	(1.41)	14.80***	0.24
Emotional stability	4.16 ^{b}	(0.91)	3.65 ^{a,b}	(0.99)	4.02 ^{b}	(1.05)	3.85 ^{a,b}	(1.08)	3.23 ^{a}	(0.98)	3.69 ^{a,b}	(1.16)	4.64***	0.09
Openness to experience	4.60	(0.89)	4.57	(0.92)	4.41	(0.81)	4.45	(1.03)	4.66	(0.91)	4.82	(1.07)	0.89	0.02

Note. Means are significantly different if they do not have a same superscript. A mean without a superscript is not significantly different from any other mean.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2.5

Univariate ANOVAs and Post-hoc Cluster Comparisons Based on Tukey HSD Tests (Sample 2)

	Indifference		Moderate		Negative attitude		Loneliness parents		Loneliness peers		Positive attitude			
Parenting	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	*F* (5, 287)	η²
Adolescent perspective														
Responsiveness mother	4.21 ^{c}	(0.62)	4.24 ^{c}	(0.47)	4.42 ^{c}	(0.43)	3.28 ^{a}	(0.68)	3.85 ^{b}	(0.64)	4.35 ^{c}	(0.51)	24.62***	0.30
Psychological control mother	1.83 ^{a}	(0.68)	2.09 ^{a}	(0.66)	1.83 ^{a}	(0.57)	2.66 ^{b}	(0.83)	2.23 ^{a}	(0.78)	1.86 ^{a}	(0.55)	10.47***	0.15
Responsiveness father	3.74 ^{c}	(0.81)	3.76 ^{c}	(0.64)	3.88 ^{c}	(0.62)	2.65 ^{a}	(0.95)	3.25 ^{b}	(0.81)	3.80 ^{c}	(0.86)	16.04***	0.22
Psychological control father	1.95 ^{a}	(0.67)	2.01 ^{a,b}	(0.55)	2.01 ^{a,b}	(0.68)	2.66 ^{c}	(0.85)	2.35 ^{b,c}	(0.69)	1.96 ^{a,b}	(0.56)	8.43***	0.13
Mother perspective														
Responsiveness mother	4.45	(0.44)	4.37	(0.41)	4.40	(0.48)	4.22	(0.59)	4.32	(0.48)	4.42	(0.59)	1.33	0.02
Psychological control mother	2.13	(0.55)	2.26	(0.68)	2.01	(0.62)	2.27	(0.57)	1.95	(0.47)	1.95	(0.74)	2.54*	0.04
Father perspective														
Responsiveness father	4.14 ^{b}	(0.54)	3.99 ^{a,b}	(0.60)	4.17 ^{b}	(0.66)	3.72 ^{a}	(0.64)	3.92 ^{a,b}	(0.62)	4.03 ^{a,b}	(0.59)	3.44**	0.06
Psychological control father	2.19	(0.63)	2.08	(0.54)	2.08	(0.67)	2.19	(0.66)	2.12	(0.52)	2.15	(0.54)	0.36	0.01

Note. Means are significantly different if they do not have a same superscript. A mean without a superscript is not significantly different from any other mean.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2.6

Univariate ANOVAs and Post-hoc Cluster Comparisons Based on Tukey HSD Tests (Sample 3)

	Indifference		Moderate		Negative attitude		Loneliness parents		Loneliness peers		Positive attitude			
Variable	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	*F*(5,772)	η²
Peer nominations														
Likability	.01 ^{a,b}	(1.03)	.11 ^{b}	(0.90)	.31 ^{b}	(0.91)	.20 ^{b}	(0.89)	-.30 ^{a}	(1.04)	-.29 ^{a}	(0.98)	7.24***	0.05
Dislikability	-.07 ^{a}	(0.92)	-.13 ^{a}	(0.89)	-.24 ^{a}	(0.78)	-.13 ^{a}	(0.76)	.28 ^{b}	(1.21)	.31 ^{b}	(1.19)	6.81***	0.04
Shyness	-.07 ^{a,b}	(0.85)	.06 ^{a,b,c}	(1.01)	-.21 ^{a,b}	(0.74)	-.26 ^{a}	(0.66)	.34 ^{c}	(1.19)	.12 ^{b,c}	(1.19)	6.50***	0.04
Aggression	-.02	(0.95)	-.11	(0.74)	-.07	(0.92)	.18	(1.19)	-.12	(0.96)	.01	(0.93)	1.57	0.01
Victimization	-.05 ^{a,b}	(0.98)	-.02 ^{a,b}	(0.88)	-.22 ^{a}	(0.58)	-.24 ^{a}	(0.53)	.41 ^{c}	(1.43)	.17 ^{b,c}	(1.23)	7.51***	0.05
Bullying	.08 ^{b}	(0.98)	-.10 ^{a,b}	(0.85)	-.09 ^{a,b}	(0.81)	.15 ^{b}	(1.12)	-.27 ^{a}	(0.82)	.01 ^{a,b}	(1.02)	2.96*	0.02
Friendships														
Friendship quantity	2.13 ^{b,c}	(0.11)	2.13 ^{c}	(0.09)	2.36 ^{c}	(0.11)	2.16 ^{c}	(0.13)	1.65 ^{a,b}	(0.13)	1.43 ^{a}	(0.14)	8.00***	0.05
Negative quality	2.03 ^{a}	(0.71)	2.14 ^{a,b}	(0.71)	2.27 ^{a,b}	(0.75)	2.34 ^{b,c}	(0.77)	2.32 ^{b,c}	(0.73)	2.57 ^{c}	(0.81)	7.01***	0.04
Positive quality	4.28 ^{c}	(0.52)	4.19 ^{b,c}	(0.47)	4.32 ^{c}	(0.45)	4.29 ^{c}	(0.40)	4.01 ^{a,b}	(0.52)	3.95 ^{a}	(0.64)	10.58***	0.06

Note. Means are significantly different if they do not have a same superscript. A mean without a superscript is not significantly different from any other mean.

* $p < .05$. ** $p < .01$. *** $p < .001$.

3.3 Correlates of the loneliness and attitudes toward aloneness profiles

Adolescents' self-esteem and personality. A multivariate analysis of variance showed significant cluster differences on adolescents' self-esteem and personality in Sample 1 ($F_{Pillai}(65, 1135) = 3.48$, $p < .001$, $\eta^2 = .17$). Subsequent univariate ANOVAs revealed significant cluster differences for all variables, except for the self-esteem domain Behavioral Conduct and the personality domain Openness to experience (Table 2.4). Post-hoc comparisons based on Tukey HSD Tests revealed significant cluster differences on adolescents' self-esteem. Adolescents in the Peer-Related Loneliness and in the Positive Attitude clusters had lower global self-esteem than the other adolescents, with the exception of adolescents in the Parent-Related Loneliness group. Adolescents in the Indifference cluster had the highest global self-esteem, though they were not significantly different from the Moderate and Negative Attitude clusters. Adolescents in the Peer-related Loneliness and Positive Attitude clusters also rated themselves lower on social competence, athletic competence, and close friendship competence compared to the other four clusters. Regarding scholastic competence, results revealed the lowest scores for adolescents in the Positive Attitude cluster, though these adolescents were not significantly different from adolescents in the Parent- and Peer-Loneliness groups. Regarding physical appearance, adolescents in the Indifference cluster scored highest, whereas adolescents in the Positive Attitude and Peer- and Parent-Related Loneliness clusters scored lower. Finally, adolescents in the Peer-Related Loneliness cluster scored lower on romantic appeal than the other adolescents, though not significantly different from the Positive Attitude cluster. Overall, adolescents in the Peer-Related Loneliness and Positive Attitude clusters had the least positive self-esteem. Compared to adolescents in the Parent-Related Loneliness cluster, adolescents in Peer-Related Loneliness cluster scored lower on social competence, athletic competence, romantic appeal, and close friendship. Effect sizes for scholastic and athletic competence were small to moderate, for physical appearance and romantic appeal moderate to large, and for global self-esteem, social competence, and close friendship large.

Significant cluster differences were found on the five personality domains. Adolescents in the Positive Attitude cluster were less agreeable than adolescents in the Moderate cluster. Regarding conscientiousness, adolescents in both the Positive Attitude cluster and the Parent-Related Loneliness cluster scored lowest. Adolescents in the Peer-Related Loneliness cluster also were less extraverted and emotionally stable, though not significantly different from adolescents in the Positive Attitude cluster. By contrast, adolescents in the Negative Attitude

and Indifference cluster scored highest on these two personality domains. Adolescents in the Peer-Related Loneliness and the Positive Attitude clusters showed the lowest levels of extraversion. Effect sizes were moderate, with a large effect for extraversion.

Parental responsiveness and psychological control. A multivariate analysis of variance showed significant cluster differences on parental responsiveness and psychological control in Sample 2 ($F_{Pillai}(40, 1420) = 3.79$, $p < .001$, $\eta^2 = .10$). Subsequent univariate ANOVAs revealed significant cluster differences for all variables, except for mothers' responsiveness and fathers' psychological control from their own perspective (Table 2.5). Post-hoc comparisons based on Tukey HSD Tests revealed significant cluster differences on parenting behaviors from the adolescents' perspective. Adolescents in the Parent-Related Loneliness cluster reported the least responsiveness of both father and mother, followed by adolescents in the Peer-Related Loneliness cluster. Adolescents in the Parent-Related Loneliness cluster reported the highest parental psychological control. Effect sizes for responsiveness were large and for psychological control moderate. Although univariate tests revealed cluster differences in psychological control from the mothers' perspective, post-hoc tests revealed no differences. Univariate tests revealed cluster differences in responsiveness from the fathers' perspective. Fathers with adolescents in the Parent-Related Loneliness cluster tended to report the least responsiveness, but the effect size was small.

Adolescents' peer group functioning and friendships. A multivariate analysis of variance showed significant cluster differences on peer group functioning and friendships in Sample 3 ($_{FPillai}(45, 3840) = 3.74$, $p < .001$, $\eta^2 = .04$). Subsequent univariate ANOVAs revealed significant cluster differences for all variables, except for the peer nomination Aggression (Table 2.6). Significant cluster differences were found on the peer nomination variables. Adolescents in the Peer-Related Loneliness and Positive Attitude clusters were less liked and more disliked by their peers. According to their peers, adolescents in the Peer-Related Loneliness cluster were further seen as more shy and more likely to be identified as victims of bullying than adolescents in the other clusters. Adolescents in the Peer-Related Loneliness cluster were less often seen as bullies, whereas adolescents in the Parent-Related Loneliness cluster were more often seen as bullies. Adolescents in the Positive Attitudes cluster were not significantly different from adolescents in the Peer-Related Loneliness cluster, but scores were less extreme. Effect sizes were small to moderate (e.g., likability and victimization).

Significant cluster differences were found for friendship quantity and quality, and conflict. Adolescents in the Peer-Related Loneliness and Positive Attitude clusters scored lower on friendship quantity and quality than the other adolescents. Adolescents in the Positive Attitude cluster reported the most conflict, though not significantly worse than adolescents in the two Loneliness clusters. Adolescents in the Indifference cluster had the least conflict, though not significantly different from adolescents in the Moderate and Negative Attitude clusters. Effect sizes were moderate.

4. Discussion

During adolescence, loneliness tends to increase (Qualter et al., 2015) and as adolescents spend an increasing amount of time on their own, they learn to use this time alone in a more deliberate way, for example, for emotional self-regulation and identity development (Larson, 1997; Long & Averill, 2003). Earlier research has distinguished between adolescent loneliness as experienced in different relationships (i.e., with parents and peers) and between positive and negative attitudes to being alone (Marcoen & Goossens, 1993). So far, the correlates of each of these constructs (e.g., associations with personality traits; Teppers et al., 2013) have been examined using a variable-centered approach, thereby neglecting the co-occurrence between loneliness and attitude to aloneness. The present study examined patterns of co-occurrence between relation-specific types of loneliness and attitudes toward aloneness by adopting a person-centered approach, that is, cluster analysis. In three independent samples, covering a total sample of about 1,800 adolescents, we found six groups of adolescents each with a unique profile of scores on parent- and peer-related loneliness and positive and negative attitudes toward being alone. In addition, we examined whether some of these groups would be more vulnerable regarding adolescents' self-esteem and personality, parental responsiveness and psychological control, and peer group functioning and friendships. To this aim, we adopted a multi-informant approach, including self-report questionnaires, parent-report questionnaires, and peer nominations. We found that the six groups of adolescents could be differentiated in a meaningful way. Three of these groups (i.e., Indifference, Moderate, and Negative Attitude), showed an adaptive profile, whereas the three other groups (i.e., Parent-Related Loneliness, Peer-Related Loneliness, and Positive Attitude) showed a more maladaptive profile and may need specific assistance.

4.1 Loneliness and attitudes toward aloneness profiles

Six groups of adolescents were identified, each of which showed a unique profile of scores on parent- and peer-related loneliness as well as negative and positive attitudes toward aloneness. One group of adolescents, labelled the Indifference group, showed moderately low to low scores on both types of loneliness and on both negative and positive attitudes. A second group of adolescents, labelled the Moderate group, showed moderately low loneliness in relation to their parents and average loneliness in relation to their peers. These adolescents further showed moderately high negative and positive attitudes toward aloneness. Adolescents in a third group, that is, the Negative Attitude group, were highly negative toward aloneness and reported moderately low loneliness in relation to both parents and peers. Adolescents in a fourth group, the Parent-Related Loneliness group, reported high feelings of loneliness in relation to their parents, but not with their peers. These adolescents further scored high on negative attitudes, and average on positive attitudes toward aloneness. A fifth group of adolescents, the Peer-Related Loneliness group, reported high feelings of loneliness in relation to their peers, but not with their parents. These adolescents further scored high on positive attitudes, and average on negative attitudes toward aloneness. Adolescents in a sixth group, which was labelled the Positive Attitude group, were highly positive about aloneness, but also reported high feelings of loneliness in both their relation with their parents and peers. These adolescents further showed low negative attitudes toward aloneness. Across the three samples, we found that more boys than expected by change were in the Indifference group. Some other gender and age differences in the distribution among the six clusters were also found, but these were not consistent across samples and represented small effect sizes.

The pattern of loneliness and attitudes toward aloneness scores of these six groups of adolescents corroborates previous research that advocates hybrid multidimensional models to examine loneliness and attitudes toward aloneness (Goossens et al., 2009; Houghton et al., 2014; Maes, Klimstra et al., 2015; Majorano et al., 2015). Regarding the two relation-specific types of loneliness, we found a group of adolescents who were lonely in the relation with their parents only, and another group of adolescents who were lonely in the relation with their peers only. Strikingly, these two groups of adolescents showed different attitudes toward aloneness. Adolescents who were lonely in the relation with their parents were negative toward aloneness, whereas adolescent who were lonely in the relation with their peers were positive toward aloneness. Some of the items of the negative attitudes subscale refer to the peer group (e.g.,

"When I am lonesome, I got to see some friends"). It might be that when adolescents do not feel connected with or understood by their parents, they turn to their peers to get the support that they are looking for. However, when adolescents are lonely in relation to their peers, they will likely not receive support from their peer group. Being positive toward aloneness might for these adolescents be a way of coping with their experiences of loneliness (Vanhalst, Goossens, Luyckx, Scholte, & Engels, 2013). Feelings of loneliness arise when there is a discrepancy between actual and desired social relationships. Being more positive toward aloneness lowers these expectations, which decreases the discrepancy leading to lower feelings of loneliness. Alternatively, being positive toward aloneness might lead to higher levels of loneliness, because by spending more time on their own, adolescents might miss too many opportunities to interact with peers, leading to experiences of loneliness in the peer context (Wang et al., 2013). Longitudinal research is needed to understand the link between loneliness and attitudes toward aloneness better.

In contrast to prior research (Vanhalst et al., 2010), we did not find a group of adolescents reporting high levels of loneliness in the relations with both their parents and peers. However, adolescents in the Positive Attitude group showed moderately high parent- and peer-related loneliness. The co-occurrence of parent- and peer-related loneliness was thus present in the current study, but to a lesser extent than in previous research. Interestingly, adolescents in the Negative Attitude group showed moderately low parent- and peer-related loneliness. This finding confirms earlier research suggesting that an overly positive attitude toward aloneness might be maladaptive (Larson, 1990; Wang et al., 2013).

The present study also adds to the growing evidence that negative and positive attitudes are not two opposite ends of the same continuum (Maes, Klimstra et al., 2015). In addition to groups of adolescents that had either negative or positive attitudes toward aloneness, we found a group of adolescents with moderately high to high scores on both types of attitudes (i.e., the Peer-Related Loneliness group). Moreover, we found an Indifference group in which the adolescents scored low on both negative and positive attitudes toward aloneness. Adolescents in the Indifference and the Moderate groups showed a different profile in terms of attitudes toward aloneness, but no significant group differences were found regarding the examined correlates. Having either low or average negative and positive attitudes toward aloneness does not seem to be associated with adolescents' adjustment.

4.2 Correlates of the loneliness and attitudes toward aloneness profiles

The six groups of adolescents were compared regarding their self-esteem and personality, parental responsiveness and psychological control, and peer group functioning and friendships. Across the three samples we found that three of the groups showed rather adaptive correlates. These adaptive correlates were shown by adolescents in the Indifference, Moderate, and Negative Attitude groups. Adolescents in the three other groups, that is, the Parent-Related Loneliness, Peer-Related Loneliness, and Positive Attitude groups, showed less adaptive correlates.

Regarding adolescents' self-esteem, adolescents in the Parent-Related Loneliness, Peer-Related Loneliness, and Positive Attitude groups, showed the lowest global self-esteem. This is in line with the evolutionary theory of loneliness, which proposes that in lonely people a survival mechanism is activated that heightens sensitivity to threats, which is accompanied by negative feelings such as stress and low self-esteem (Hawkley & Cacioppo, 2010). When examining subdomains of self-esteem, adolescents in the Peer-Related Loneliness and Positive Attitude groups showed lower self-esteem in the domains of social competence, athletic competence, physical appearance, romantic appeal, and close friendship. Strikingly, both of these two groups had moderately high to high scores on peer-related loneliness and positive attitudes toward aloneness. It is not surprising that adolescents in the Parent-Related Loneliness group did show strong effects in these subdomains, as these subdomains are more relevant in the peer context. Also, the Sociometer Hypothesis (Leary et al., 1995) states that self-esteem functions as a sociometer that monitors the extent to which an individual is included or excluded by other people. This too might be more likely in the peer than in the parent context.

Regarding the Big Five personality characteristics, our results were partly in line with prior research (Teppers et al., 2013). That is, adolescents in the Peer-Related Loneliness and Positive Attitude groups were characterized by low extraversion, adolescents in the Peer-Related Loneliness group showed low emotional stability, and adolescents in the Parent-Related Loneliness group were less conscientious. Also in agreement with Teppers et al. (2013), adolescents in the Positive Attitudes group were less agreeable than adolescents in the Moderate group. In contrast to prior research, adolescents with high positive attitudes to being alone were less conscientious and no significant differences were found between the groups in openness. It might be that low agreeableness, emotional instability, low conscientiousness, and

introversion, reduce social attractiveness and have a negative effect on one's interactional behavior and one's reactions to changes in social relationships (Peplau & Perlman, 1982). However, these personality characteristics might not be equally important for different relationships. It could be, for example, that conscientiousness is more valued by parents, whereas extraversion is more valued by peers. More research in this regard is needed to confirm these hypotheses.

The groups of adolescents were also compared regarding parental responsiveness and psychological control from their own perspective and the perspective of their mothers and fathers. In line with previous research (Scharf et al., 2011), adolescents in the Parent-Related Loneliness group reported lower parental responsiveness and higher parental psychological control than adolescents in any other group. The same pattern was found when parents themselves reported on their parenting behavior, but the effects were small or non-significant. Attachment theory and empirical work suggested that adolescents develop an internal working model based on their experiences with their parents, which they generalize to their relationships with peers (Cassidy & Berlin, 1999; Rotenberg, 1999; Scharf et al., 2011). In line with this work, we found that adolescents in the Peer-Related Loneliness group reported lower responsiveness from both father and mother compared to adolescents with low loneliness scores.

We examined different types of peer relations, including the larger peer group and dyadic friendships, as proposed by the social needs perspective (Weiss, 1973). As expected, adolescents in the Peer-Related Loneliness and Positive Attitude group were less liked and more disliked by their peers than adolescents in the other groups. Adolescents in the Peer-Related Loneliness group were also more often identified by their peers as shy and as being a victim of bullying, and were less often seen as bullies. Adolescents in the Peer-Related Loneliness group further had the least friends and reported the lowest friendship quality. Adolescents in the Positive Attitude group showed a similar pattern regarding their friendships, but with less extreme scores. These adolescents also reported more conflict in their friendships.

To summarize, we found, as expected, that adolescents in the Parent-Related Loneliness group showed less adaptive correlates regarding parenting behaviors, followed by adolescents in the Peer-Related Loneliness group. Adolescents in the Peer-Related Loneliness and Positive Attitudes groups showed the least adaptive correlates regarding peer groups functioning and friendships. One implication of these findings is that, even though time spending alone might

become more adaptive in adolescence (Larson, 1997; Long & Averill, 2003), too much time alone might be maladaptive as adolescents might miss important opportunities for social interactions (Wang et al., 2013). Another implication of our study is that adolescents experiencing parent- or peer-related loneliness seem to need specific assistance, that is, regarding either their relations with their parents or with their peers, respectively. However, the large majority of studies on adolescents' loneliness still uses either the UCLA Loneliness Scale (Russell, Peplau, & Cutrona, 1980) or the Children's Loneliness Scale (CLS; Asher, Hymel, & Renshaw, 1984). Both of these scales are unidimensional and, based on their item content and factor analyses, tap mostly into peer-related loneliness (Goossens & Beyers, 2002; Goossens et al., 2009). In the majority of studies on adolescents' loneliness, we are thus likely to overlook those adolescents who experience parent-related loneliness and who might need assistance in this particular context.

4.3 Strengths and limitations

The present study has a number of important strengths. First, we adopted a person-centered approach, that is, cluster analysis, to examine the co-occurrence between adolescents' loneliness and their attitudes toward aloneness that had previously been neglected. Second, we replicated the different groups of adolescents that resulted from the cluster analysis across three independent samples, covering a total sample of about 1,800 adolescents. Third, we adopted a multi-informant approach and included self-reported questionnaires, parent-reported questionnaires, and peer nominations. Fourth, based on Bronfenbrenner's (1977) ecological model of human development, we examined not only adolescents' personal characteristics, but also included the parent and peer context. The broad set of correlates that was examined, allowed us to differentiate clearly between the clusters. Our study, therefore, expands the extant literature on adolescent loneliness and attitudes to being alone through its careful use of measures and statistical methods.

However, there are also some limitations to keep in mind when interpreting the results. First, all three samples were collected in the Dutch-speaking part of Belgium in schools that are known to attract mainly Caucasian middle class students, so the findings might not be generalizable beyond this particular population. Second, different outcome variables were administered in each of these samples so that we were unable to compare the groups on the same outcome variables across the three samples. Third, some of the subscale scores of the

Self-Perception Profile for Adolescents (Harter, 1985), especially the Close Friendship subscale, had somewhat low reliabilities. Fourth, the present study was cross-sectional, so we cannot examine the direction of effects. The examined correlates may be predictors as well as outcomes of loneliness and attitudes toward aloneness, and some of the relations are likely to be bidirectional. Moreover, it would be interesting to see whether adolescents change from one profile to another over time and how such changes relate to their adjustment. Fifth, although our study examined variables related with both the larger peer group and dyadic friendships, future research might also examine whether different subtypes of peer-related loneliness can be distinguished. In the current study, we used a subscale that mostly taps into peer group loneliness (i.e., feelings of lacking a network of social relationships. Other questionnaires, such as the Peer Network and Dyadic Loneliness Scale (PNDLS; Hoza, Bukowski, & Beery, 2000), also tap into peer dyadic loneliness (i.e., feelings of lacking a close, intimate attachment to another person). Finally, in line with Bronfenbrenner's (1977) ecology of human development, we examined, in addition to personal characteristics, characteristics from the parent and peer context. However, other systems might be important as well, including the neighborhood these adolescents live in or the larger cultural community. Future replication efforts, therefore, should concentrate on adolescents with different cultural and socio-economic backgrounds, a broader set of correlates, and alternative social contexts, and rely on designs that are developmentally sensitive and provide hints about the direction of effects in the chain of events that link loneliness and attitude to being alone to their supposed correlates.

4.4 Conclusion

The present study moved beyond one of the major limitations of current work on adolescent loneliness and attitudes toward aloneness, that is, its neglect of the co-occurrence among the different constructs involved through the use of simple correlational techniques. Using an innovative, person-centered approach, the present study identified six groups of adolescents, each with a unique profile regarding parent- and peer-related loneliness and negative and positive attitudes toward aloneness. Three of these groups showed an adaptive pattern of correlates regarding adolescents' self-esteem and personality, parental responsiveness and psychological control, and peer group functioning and friendships. Less adaptive correlates were found for adolescents in the Parent-Related Loneliness, Peer-Related Loneliness, and Positive Attitudes groups. These results provide initial clues to the specific needs of intervention these groups could benefit from (i.e., assistance with relationships with

parents for the first group, and assistance with relationships with peers for the other two groups). Our findings further indicated that the two forms of loneliness, in the parental and peer realm, respectively, can be clearly distinguished and that negative and positive attitudes toward aloneness do not represent two extremes on the same continuum (c.f., Maes, Klimstra et al., 2015). As a result, researchers who wish to investigate loneliness and its associated variables, may want to adopt a multidimensional approach (Goossens et al., 2009) instead of a global or undifferentiated one. The present study, therefore, represents an important step toward a better understanding and improved measurement of adolescent loneliness and attitudes to being alone.

3

Loneliness in the Peer Context:

Zooming in on a Loneliness Measure

Maes, M., Van den Noortgate, W., Vanhalst, J., Beyers, W., & Goossens, L. (2015). The Children's Loneliness Scale: Factor structure and construct validity in Belgian children. *Assessment.* Advance online publication. doi:10.1177/1073191115605177

Abstract

The present study examined the factor structure and construct validity of the Children's Loneliness Scale (CLS), a popular measure of childhood loneliness, in Belgian children. Analyses were conducted on two samples of 5th and 6th graders in Belgium, for a total of 1,069 children. A single-factor structure proved superior to alternative solutions proposed in the literature, when taking item wording into account. Construct validity was shown by substantial associations with related constructs, based on both self-reported (e.g., depressive symptoms and low social self-esteem), and peer-reported variables (e.g., victimization). Furthermore, a significant association was found between the CLS and a peer-reported measure of loneliness. Collectively, these findings provide a solid foundation for the continuing use of the CLS as a measure of childhood loneliness.

1. Introduction

Loneliness is the negative feeling that arises when people perceive their social relations to be deficient, either quantitatively or qualitatively (Perlman & Peplau, 1981). This negative feeling is a problem that affects people of all ages, including children and adolescents (Qualter et al., 2015). Feelings of loneliness have been associated with poorer mental and physical well-being. For example, loneliness in childhood and adolescence has been linked with lower school liking, school drop-out, depression, social anxiety, lower self-esteem, peer rejection and victimization, eating disorders, suicide ideation, sleeping problems, and poorer cardiovascular functioning (Heinrich & Gullone, 2006; Mahon, Yarcheski, Yarcheski, Cannella, & Hanks, 2006).

Several instruments have been developed to assess feelings of loneliness. The first scale developed to measure this phenomenon in childhood is the Children's Loneliness Scale (CLS; Asher, Hymel, & Renshaw, 1984). Originally referred to as the Loneliness and Social Dissatisfaction Questionnaire (LSDQ), the measure was developed in the US for Grades 3 through 6. Meanwhile, the scale has been used also in middle school (i.e., Grades 7 and 8; Parkhurst & Asher, 1992) and, in a slightly adapted format, from preschool to Grade 2 (Cassidy & Asher, 1992). In a frequently used adaptation of the measure, all items were rephrased to refer to the school context (Asher & Wheeler, 1985). In both its original and adapted versions, the measure has established itself as the 'gold standard' in the measurement of childhood loneliness. The Web of Science indicates that the original article (Asher et al., 1984) was referred to 428 times and the article that introduced the school-related version (Asher & Wheeler, 1985) 387 times (information retrieved on August 5, 2015). The CLS has been translated in numerous languages and used in several countries, including Australia, Canada, China, Germany, Greece, India, Israel, Italy, Korea, Turkey, and the United Kingdom, but most psychometric studies on the measure have been conducted in the US.

Several issues that pertain to key aspects of the validity of the CLS have not been resolved completely. The present article addressed two of these issues for the school-related version of the CLS. Specifically, we aimed to examine whether the instrument exhibits (a) its expected factor structure and (b) substantial correlations with a well-selected set of related constructs.

1.1 Factor structure of the CLS

In the literature, indications for three possible factor structures of the CLS can be found. First, as the scale was intended to tap into a unitary construct of loneliness, the original scale developers aimed to show that all of their items loaded on a single factor. Exploratory factor analysis (EFA) on third- through sixth-grade US children, on a medium-sized sample ($N > 500$) for the original version and a small sample ($N < 300$) for the school-related version, indicated that all 16 substantive items effectively loaded on a single factor (Asher et al., 1984; Asher & Wheeler, 1985). Second, two conceptual factors, that is, loneliness and social dissatisfaction, were distinguished using factor analysis. Specifically, EFA on two small samples ($N < 300$) of ninth-grade US students (Jarvinen & Nicholls, 1996) and fifth- and sixth-grade US children with diverse ethnical backgrounds (Bagner, Storch, & Roberti, 2004) yielded a Loneliness factor, with high loadings for 10 items, and a Social dissatisfaction factor, with high loadings for the remaining 6 items. As all items that loaded on the Loneliness factor were non-reverse coded (e.g., "I'm lonely at school") and all items that loaded on the Social dissatisfaction factor were reverse coded (e.g., "I am well liked by the kids in my class"), a third factor structure can be proposed. This structure comprises a single substantive factor that takes into account item wording. A confirmatory factor analysis (CFA) on a large sample ($N > 10{,}000$) of 2nd- through 12th-grade US children modelling one such substantive factor with correlated error terms for the reverse coded items yielded a superior fit for this factor structure (Ebesutani et al., 2012). However, as this study was conducted in a single state in the Southern part of the US, replication of the findings in other cultures is required.

1.2 Construct validity

Construct validity may be investigated by examining associations with related constructs. Loneliness, as measured with the CLS, has been associated with various characteristics of the child and its social environment. In childhood, loneliness has been associated with higher levels of depressive symptoms (Toblin, Schwartz, Gorman, & Abou-Ezzeddine, 2005), lower global self-esteem (Aikins, Bierman, & Parker, 2005), and lower social self-esteem (Troop-Gordon & Ladd, 2005). Furthermore, in Kindergarten, loneliness has been positively related with school avoidance and negatively with school liking (Coplan, Closson, & Arbeau, 2007). These relations have not yet been examined in older children. Regarding peer-reported measures, loneliness in childhood has been associated with fewer friendships (i.e.,

received nominations; Shin, 2010), lower peer acceptance and higher peer rejection (Graham & Juvonen, 1998), and being victimized by peers (Boivin, Hymel, & Bukowski, 1995). In addition to examining related constructs, construct validity may be investigated by examining a loneliness measure completed by a different rater, such as peers.

The present study aims to examine the expected factor structure and construct validity of the school-related version of the CLS in a Belgium. Both the US and Belgium are Western countries that are rather individualistic. Some cultural differences between these two countries, however, are also noticeable. For example, in Belgium power inequalities and hierarchy are much more accepted than in the US (Hofstede, 2001). Moreover, Belgium has one of the highest scores on Hofstede's (2001) Uncertainty Avoidance dimension, which is the extent to which members of a culture feel threatened by ambiguous or unknown situations, whereas the US scores below average on this dimension. Because of these different cultural profiles, we cannot assume that results obtained with US samples also hold for samples from other countries such as Belgium. The two psychometric issues, that is, the factor structure and construct validity of the CLS, were addressed in two studies, conducted on a separate sample as described below.

2. Study 1: Factor Structure

The first study set out to compare the three putative factor structures for the 16 substantive items of the CLS. Model 1 is a single-factor substantive model in which all items load on the same loneliness factor. Model 2 is a two-factor model, with the factors reflecting the non-reverse coded and reverse coded items (defined by 10 and 6 items, respectively). Model 3, finally, is a single-factor model with correlated error terms for the reverse coded items to take into account item wording. Our general expectation, in line with earlier comparisons (Bagner et al., 2004; Ebesutani et al., 2012), was that Model 3 would yield the best fit to the data. If confirmed, this result would indicate that the CLS can be considered a unidimensional measure of loneliness if the effect of item wording is also taken into account.

2.1 Method

2.1.1 Participants and procedure

The sample comprised 422 students (211 girls and 210 boys, 1 did not report gender) from Grade 5 and 334 students (192 girls and 142 boys) from Grade 6, for a total of 756 children. The children were 9 to 15 years old (M = 10.92, SD = 0.63). Complete CLS data were available

for 88.1% of the participants (9.5% had one missing item and 2.3% had two or three missing items). This large sample was created by merging the three samples described in Goossens and Beyers (2002). Data were collected in 1998, in 13 schools in the Dutch-speaking part of Belgium. Information on the ethnic background of the students was not available, but all schools were known to attract mainly Caucasian students.

School principals gave permission to conduct the study in their schools but children could refuse to participate at any time if they wanted to, in line with ethical standards at the time of data collection. Children completed the CLS during regular classes that were supervised by a trained undergraduate student in psychology.

2.1.2 Measure

Students completed the Dutch translation of the school-related version of the CLS (Asher & Wheeler, 1985). This 24-item scale comprises 16 primary items designed to tap into children's feelings of loneliness and social dissatisfaction in the school context (sample item: "I feel left out of things in school") and 8 filler items on children's hobbies and preferred activities and school subjects (sample item: "I watch TV a lot"). All items were responded to on a 5-point scale ranging from 1 (*not at all*) to 5 (*always*). Responses on the primary items were summed. Children's scores on the CLS, therefore, could range between 16 and 80, with higher scores reflecting higher degrees of loneliness.

2.1.3 Plan of analyses

Confirmatory factor analyses were conducted in Mplus 6.11 (Muthén & Muthén, 2007) using full information maximum likelihood estimation (FIML). The CLS scores were treated as continuous. Fit indices used to evaluate absolute model fit included the Root Mean Square Error (RMSEA), the Standardized Root Mean Square Residual (SRMR), and the Comparative Fit Index (CFI). We followed the guidelines of Hu and Bentler (1999), and considered model fit as good if RMSEA < .06, SRMR < .08, , and CFI > .90. In addition, we looked at Akaike's Information Criterion (AIC) with lower values representing better fit.

Table 3.1

Fit Indices for Three Factorial Models for the Children's Loneliness Scale (CLS)

Model	*df*	χ^2	RMSEA	CFI	SRMR	AIC
1. One factor	104	624.63	.08	.87	.06	32,465.15
2. Two factors	103	490.18	.07	.90	.05	32,332.70
3. One factor with method effects	89	433.75	.07	.91	.05	32,304.27

Note. RMSEA = Root mean square error of approximation; CFI = Comparative fit index; SRMR = Standardized root mean square residual; AIC = Akaike's information criterion.

Table 3.2

Standardized Factor Loadings of the Confirmatory Factor Analyses on the CLS

Item	Item content	Model 1	Model 2	Model 3
Reverse coded items				
1	It's easy for me to make new friends at school.	-.59	.59	-.56
4	I'm good at working with other children in my class.	-.61	.64	-.51
8	I have a lot of friends in my class.	-.75	.77	-.68
10	I can find a friend in my class when I need one.	-.63	.65	-.55
16	I get along with my classmates.	-.78	.82	-.67
22	I am well-liked by the kids in my class.	-.60	.62	-.52
Non-reverse coded items				
3	I have nobody to talk to in class.	.24	.30	.29
6	It's hard for me to make friends at school.	.59	.59	.60
9	I feel alone at school.	.66	.69	.69
12	It's hard to get kids in school to like me.	.42	.45	.45
14	I don't have anyone to play with at school.	.46	.51	.51
17	I feel left out of things at school.	.67	.69	.68
18	There's no other kids I can go to when I need help in school.	.31	.35	.35
20	I don't get along with other children in school.	.43	.48	.48
21	I'm lonely at school.	.68	.71	.71
24	I don't have any friends in class.	.37	.43	.43

2.2 Results

Fit indices and standardized factor loadings for the three models examined are presented in Table 3.1 and 3.2, respectively. Inspection of the absolute fit indices revealed that Model 2 and Model 3 showed a good absolute fit to the data. Regarding CFI and AIC, Model 3 showed a somewhat better fit than Model 2. As Model 3 is also more parsimonious, this one-factor model that incorporated wording effects was preferred over Model 2, in line with our general expectation. Moreover, the two factors of Model 2 showed a high correlation (r = .85), which does not support a multidimensional approach.

3. Study 2: Construct Validity

The second study investigated construct validity by examining associations with related constructs reported by both the adolescents and their peers. We expected that loneliness was positively related with depressive symptoms, school avoidance, peer rejection, and victimization, and negatively related with social and global self-concept, school liking, friendship quantity, and peer acceptance. Moreover, this study included a peer-reported measure of loneliness, which has not been used in the literature before. A positive association between self- and peer-reported measures of loneliness was expected. When examining the construct validity of the CLS, we controlled for gender. However, we had no specific hypotheses regarding gender effects, as previous findings have been rather inconsistent, with higher scores for girls (Lavallee & Parker, 2009), higher scores for boys (Lackaye & Margalit, 2006), or no differences between boys and girls (Kingery, Erdley, & Marshall, 2011).

3.1 Method

3.1.1 Participants and procedure

The sample comprised 134 students from Grade 5 (66 girls and 68 boys) and 179 students from Grade 6 (99 girls and 80 boys), for a total of 313 children. The children were 10 to 13 years old (M = 11.06, SD = 0.73). Data were collected in 2013, in 16 classes in 6 schools in the Dutch-speaking part of Belgium. Information on the ethnic background of the students was not available, but the schools involved were known to attract mainly Caucasian students. Data of two participants were dropped from the current analyses, because they had missing data for one or more subscales. Of the remaining 311 children, 283 (91%) had complete data,

whereas the others were missing one (7.4%) or a few items (1.6%). We imputed missing values using the Relative Mean Substitution (RMS) approach (Raaijmakers, 1999).

Parents were informed about the purpose of the study. In five of the schools, the parents could indicate in writing that they did not want their child to participate in the study (i.e., waiver of parental written consent). In one of the schools, parents had to give their consent in writing before their child could participate in the study (i.e., active parental consent). In all of the schools, children could refuse to participate at any time, in line with ethical standards at the time of data collection. The children completed all instrumentation during regular classes that were supervised by an undergraduate student in psychology.

3.1.2 Measures

This study used the CLS and other self-reported questionnaires assessing depressive symptoms, social and global self-esteem, and school liking and avoidance. Furthermore, a set of peer nominations and ratings was used assessing friendships, peer acceptance and rejection, and peer victimization. Finally, a peer-reported measure of loneliness was employed.

Self-reported measures. Depressive symptoms were measured using the Dutch Depression Questionnaire – Short Form (De Wit, 1987). This 12-item instrument comprises 9 primary items that tap into depressive symptoms (sample item: "I feel rather down lately") and 3 filler items about favorite hobbies (sample item: "I like to play on the computer"). All items were responded to in binary fashion (*yes*, scored as 1, or *no*, scored as 0). Scores on the primary items are summed to yield an overall score for depressive symptoms. This scale has substantial validity as shown through a significant correlation with another self-reported depression measure for children, that is, the Children's Depression Scale (Tisher, Lang-Takac, & Lang, 1992).

Both global self-esteem and social self-esteem (8 items each) were measured by means of a Dutch adaptation (Simons & Frisette, 2001) of two subscales of the Self-Description Questionnaire (Marsh, 1988). Sample items are "On the whole, I have a lot to be proud about" and "Most other kids like me" for global and social self-esteem, respectively. All items were responded to on a 5-point scale ranging from 1 (*not at all*) to 5 (*always*). Scores for each subscale were averaged to form an overall index of global and social self-esteem, respectively.

School liking and school avoidance were measured by means of the School Liking and School Avoidance Questionnaire (Ladd, 1990; Ladd & Price, 1987). Sample items for the School liking (9 items) and the School avoidance (5 items) subscales are "Are you happy when you are at school?" and "Would you like to stay home rather than go to school?". All items were responded to on a 5-point scale ranging from 1 (*not at all*) to 5 (*always*). Scores for each subscale were averaged to form an overall index of school liking and school avoidance, respectively.

Peer-reported measures. Both peer nominations and peer ratings were employed. For the nominations, each participant received a numbered alphabetical list of all class members and unlimited nominations were used. Friendship was measured by the number of nominations received for 'being a friend'. Two sociometric items captured social acceptance (i.e., the children in your class you like most) and social rejection (i.e., the children in your class you like least). Children were instructed to read each item, consider the peers in their class who fitted the description best, and then write down the numbers of those peers. The number of received nominations was standardized within each class to account for differences in class size.

To measure peer victimization, peer ratings were used. Each participant had to rate all other class members on three victimization items, using a yes - no format. These items were "gets to hear bad things", "others act mean to him/her", and "is beaten or pushed". For each child, the scores were averaged across classmates and used to create a 3-item peer-rated measure of victimization. Peer-reported loneliness was measured in a similar way. For each of their classmates, children rated how lonely they thought each classmate felt. The rating for this item ("Feels lonely") had to be performed using a 5-point scale ranging from 1 (*not at all*) to 5 (*always*). For each participant, the ratings received were averaged across all participating classmates to yield a standardized peer-rated measure of loneliness or loneliness reputation. Children were specifically instructed to refrain from self-ratings and any such ratings were ignored when averaging the received scores.

Table 3.3

Descriptive Statistics, Reliability, and Intercorrelations of Study Variables

Variable	*M*	*SD*	α	1	2	3	4	5	6	7	8	9	10
Self report													
1. Loneliness	1.86	0.53	.85	-									
2. Depressive symptoms	1.77	0.25	.77	.45***	-								
3. Social self-concept	3.43	0.65	.86	-.65***	-.40***	-							
4. Global self-concept	3.60	0.57	.81	-.42***	-.43***	.64***	-						
5. School liking	3.67	0.77	.92	-.32***	-.31***	.21***	.29***	-					
6. School avoidance	2.56	0.85	.82	.20***	.20***	-.06	-.18**	-.75***	-				
Peer report													
7. Friendships	0.54	0.16	NA	-.34***	-.22***	.29***	.13*	.12*	-.11*	-			
8. Acceptance	0.00	0.98	NA	-.31***	-.23***	.30***	.08	.09	-.12*	.61***	-		
9. Rejection	0.00	0.98	NA	.37***	.18**	-.29***	-.10	-.14*	.16**	-.62***	-.69***	-	
10. Victimization	0.09	0.14	.91	.46***	.24***	-.31***	-.13*	-.17**	.15**	-.45***	-.46***	.56***	
11. Loneliness	1.43	0.44	NA	.56***	.32***	-.46***	-.22***	-.14*	.08	-.58***	-.57***	.59***	.77***

Note. NA = Not applicable.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3.4

Hierarchical Regression Analysis Predicting Loneliness

	Step 1			*Step 2*			*Step 3*			
Predictor	*B*	*SE B*	β	*B*	*SE B*	β	*B*	*SE B*	β	VIF
Intercept	1.80	0.04		1.81	0.03		1.80	0.03		
Gender	0.12	0.06	.11*	0.11	0.05	.10*	0.11	0.05	.10*	1.29
Depressive symptoms				0.41	0.10	.19***	0.10	0.02	.18***	1.43
Social self-esteem				-0.42	0.04	-.52***	-0.25	0.03	-.49***	2.16
Global self-esteem				0.04	0.05	.04	0.02	0.03	.04	1.96
School liking				-0.07	0.04	-.10	-0.05	0.03	-.10	2.55
School avoidance				-0.01	0.04	-.02	0.00	0.03	.00	2.45
Friendships				-0.18	0.17	-.06	-0.01	0.03	-.02	1.99
Acceptance				0.05	0.03	.08	0.06	0.03	.11	2.29
Rejection				0.04	0.03	.07	0.04	0.03	.07	2.49
Victimization				0.79	0.19	.20***	0.04	0.03	.08	2.71
Peer-rated loneliness							0.12	0.04	.23**	3.52

Note. $\Delta R^2 = .01$ ($p < .05$) for Step 1, $\Delta R^2 = .55$ ($p < .001$) for Step 2, and $\Delta R^2 = .02$ ($p < .01$) for Step 3. VIF = Variance Inflation Factor.

* $p < .05$. ** $p < .01$. *** $p < .001$.

3.2 Results

Internal consistency for and correlations among all study variables are presented in Table 3.3. As can be seen, all self-report measures and the peer-reported victimization scale showed high levels of internal consistency (ranging between .77 and .92). The CLS exhibited significant correlations with all the other variables. As expected, loneliness was positively associated with depressive symptoms and school avoidance, and negatively with social self-esteem, global self-esteem, and school liking. For the peer-report measures, loneliness showed the expected negative associations with the number of friends and with social acceptance, and the expected positive associations with social rejection and victimization. A significant and positive correlation was found between self-reported and peer-reported loneliness. This peer-related measure was also strongly related with the other peer-reports, especially regarding peer victimization.

The results of the hierarchical regression analysis are presented in Table 3.4. In Step 1, gender was entered as a control variable, in Step 2, all related constructs were entered, and in Step 3, peer-reported loneliness was entered. The Variance inflation factors (VIF) did not indicate problems of multicollinearity (i.e., all VIF values < 5; O'Brien, 2007). In all steps, a significant effect for gender was found, indicating that boys reported more loneliness than girls. In Step 2, depressive symptoms, social self-esteem, and peer-reported victimization significantly predicted CLS scores. In Step 3, the effect of peer-rated loneliness was significant, but the effect of peer-reported victimization disappeared. Collectively, the related constructs in Step 2 explained a sizeable portion of the variance in CLS scores (i.e., more than 50%). Adding peer-rated loneliness increased the explained variance by 1.5%.

4. Discussion

The present study expanded significantly on the extant knowledge base on the psychometric properties of the CLS, the primary measure of childhood loneliness. Specifically, analyses on children in Grades 5 and 6, for a total of 1,069 participants allowed us to fill two gaps in the literature on this scale.

First, we replicated the findings of Ebesutani et al. (2012) in a Belgian sample, providing evidence for the unidimensional nature of the CLS, when item wording is taken into account. This successful replication significantly extends current evidence on the factor structure of the CLS, which had hitherto been restricted, in large part, to studies conducted in the US. At this

moment, combining information across cultures, there is insufficient conceptual and empirical evidence to prefer a multi-factor structure over a single-factor structure and researchers should be very cautious about creating sub-factors for the CLS.

Second, we found that a substantial portion of the variance in the CLS scores was accounted for by a well-selected set of related constructs. Controlling for the other variables in the model, children experiencing feelings of loneliness, also experienced depressive symptoms and lower social self-esteem more often than their non-lonely peers. Furthermore, a substantial association was found with an alternative measure of the construct that used an innovative peer-report format. As the children were asked to judge their classmates' internal state of loneliness, they might have based their judgement regarding their classmates' loneliness on what they can observe, such as bullying and peer rejection. Indeed, the peer-related measure of loneliness was strongly related with the other peer-reports, especially the peer victimization measure, and it added little variance to the hierarchical regression. However, loneliness represents a subjective state that cannot be inferred easily from objective social interactions. Further research is needed to understand to which degree children rely on observed social interactions or expressions of negative affect, for instance, when asked to infer an individual's internal state such as loneliness. Furthermore, some gender differences in loneliness were found, indicating that boys reported more loneliness than girls. However, this finding needs to be interpreted with caution as the effect was small and previous findings regarding gender differences in loneliness have been inconsistent.

The present study has several strengths, including the fact that two different samples were used and that we did not rely exclusively on self-reports for the measurement of loneliness. There are, however, some limitations that have to be pointed out. First, our research was conducted in a specific country on samples of mainly Caucasian children and our results may not generalize to other countries or to children with a different ethnic background. In our sample, measures related to the peer context were important predictors of loneliness. However, the peer context is not of equal importance in different cultures. Studies in cultures that attach a different value to relationships with peers than is common in the US and Belgium could yield different results (Liu, Li, Purwono, Chen, & French, 2015). Second, our first study was conducted on relatively old data. However, the fact that our findings replicated more recent findings (Ebesutani et al., 2012) is encouraging. Third, our studies only examined children in Grades 5

and 6 and care should be taken, therefore, not to extend our findings to the entire intended age range of the instrument (i.e., roughly 5 to 15 years of age or preschool to junior high school).

The peer-reported loneliness measure used in the present study is promising and raises issues regarding the inferential basis of peer-reported loneliness and its link with self-reported loneliness. Additional work could be conducted regarding the associations between standard self-report measures such as the CLS and alternative measures of loneliness, using other types of informants, such as parents (Waaktaar & Torgersen, 2012) or teachers (Heiman, 2002). Pending further comparative research that uses such measures, the present series of studies provides a solid foundation for the continuing use of the CLS in research on children's loneliness.

4

Loneliness in the Peer Context:

Intimate and Relational Loneliness

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Abstract

Research on peer-related loneliness in adolescence has paid insufficient attention to the distinction between intimate loneliness (i.e., the dyadic context of friendship) and relational loneliness (i.e., the broader context of the peer group). The present study addressed this gap by examining the correlations among a broad set of loneliness scales. A sample of adolescents from Belgium (N = 282; 60% female) completed 8 subscales of 6 established loneliness measures. Results revealed high correlations among these measures. At the same time, confirmatory factor analysis revealed the two expected factors, reflecting intimate and relational loneliness. Boys scored higher on intimate loneliness and girls scored higher on relational loneliness, but these differences were small and not consistent across measures.

1. Introduction

The need to belong is a universal phenomenon reflecting that every human has a fundamental desire to form social attachments (Baumeister & Leary, 1995). When something is missing in these social attachments, people experience a form of social pain, that is, loneliness (Cacioppo, Cacioppo, et al., 2015). Experiences of loneliness occur throughout the lifespan, but has been found to peak during adolescence (Qualter et al., 2015), possibly due to various changes in social expectations, roles, and relationships (Heinrich & Gullone, 2006). Moreover, during adolescence, the peer context becomes increasingly important (Meeus & Deković, 1995). Adolescents can experience loneliness in some peer relationships (e.g., with a best friend), but not in others (e.g., a peer group), suggesting that different types of loneliness exist. Several loneliness questionnaires have been developed, but it is not always clear which type of loneliness they assess. The present study, therefore, examined several loneliness measures assessing different types of loneliness within the peer context, as experienced by adolescents. Moreover, as experiences with peers differ for boys and girls (Rose & Rudolph, 2006), gender differences in these types of loneliness were also examined.

1.1 Loneliness in adolescence

Loneliness is defined as the unpleasant feeling that occurs when people perceive their network of social relationships to be deficient in a quantitative or qualitative way (Perlman & Peplau, 1981). During adolescence, especially in Western cultures, the tension between social connection and individuation peaks (Larson, Richards, Moneta, Holmbeck, & Duckett, 1996). On the one hand, adolescents are expected to conform to the peer group and have close and intimate friends. On the other hand, gaining independence is a central developmental task in this phase of life. Adolescents may struggle to find a balance regarding this issue, which may lead to increased feelings of loneliness. Previous research demonstrated the detrimental effects of loneliness by showing that lonely people have more psychological problems, such as depression and anxiety, physical problems, such as sleep problems and cardiovascular incidents, become ill more quickly, and pass away at an earlier age (see for reviews Ernst & Cacioppo, 1999; Goossens et al., 2015; Heinrich & Gullone, 2006; Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015).

Sources of loneliness differ across the lifespan. For adolescents, the peer context becomes increasingly important (Qualter et al., 2015). Within the peer context, different types

of peer relationships exist, including dyadic friendships and peer groups (Ladd, Kochenderfer, & Coleman, 1997; Rubin, Bukowski, & Bowker, 2015). According to the social needs perspective, different social relationships may fulfill different social needs (Weiss, 1973, 1974). Weiss distinguished different social needs that may be fulfilled by different relationships, such as attachment, social integration, reassurance of worth, and guidance. Whereas certain needs may be fulfilled by both dyadic friendships and the peer group (e.g., reassurance of worth), other needs may be fulfilled particularly by dyadic friendships (e.g., attachment) or by the peer group (e.g., social integration). Given that adolescents develop different types of peer relationships which may fulfill different social needs, and given that loneliness can be attributed to unmet social needs, loneliness may be limited to one type of peer relationship only. For example, when social needs are not met within the peer group, one may feel lonely in this regard, without experiencing loneliness in the relationship with a dyadic friend.

1.2 Intimate and relational loneliness

An increasing amount of research distinguished among different types of loneliness, but used different labels (e.g., peer network loneliness versus dyadic loneliness, or social versus emotional loneliness). Until recently, an overarching framework connecting the different types of loneliness from different research traditions was missing. Cacioppo, Grippo, London, Goossens, and Cacioppo (2015) recently proposed such a framework, suggesting that there are three types of loneliness: intimate, relational, and collective loneliness. Intimate loneliness is the feeling of lacking a close, intimate attachment to another person (e.g., a best friend). Relational loneliness is the feeling of lacking a network of social relationships (e.g., a peer group). These two types of loneliness have been proposed in the literature before, and correspond to Weiss' (1973) distinction of emotional and relational loneliness. The third type of loneliness, that is, collective loneliness, refers to one's valued social identities and how one is connected with similar others at a distance, including one's school, neighborhood, or cultural group.

No loneliness measures have been developed based on this theoretical framework, but many existing and well-validated measures can be categorized into one of the three types of loneliness based on theoretical grounds. Below, we critically review the six most commonly used loneliness instruments in adolescent samples, and suggest a categorization of those measures into one of the three types of loneliness proposed in the framework of Cacioppo,

Grippo et al. (2015). Specifically, we focus on those measure that tap into loneliness in the peer context.

1.3 Six measures of loneliness

Six loneliness questionnaires exist that have been used to examine adolescents' loneliness in the peer context. Two of these measures have explicitly been developed to distinguish between intimate and relational loneliness, that is, the Peer Network and Dyadic Loneliness Scale (PNDLS; Hoza, Bukowski, & Beery, 2000) and the Relational Provisions Loneliness Questionnaire (RPLQ; Hayden, 1989). Two other loneliness questionnaires, that is, the Children's Loneliness Scale (CLS; Asher & Wheeler, 1985) and the peer-related loneliness subscale of the Loneliness and Aloneness Scale for Children and Adolescents (LACA; Marcoen, Goossens, & Caes, 1987) aimed to asses loneliness in the peer context, but have not explicitly been developed to tap into a specific type of loneliness. However, based on item content, both scales assess relational loneliness only. The last two loneliness questionnaires, that is, the UCLA Loneliness Scale (Russell, Peplau, & Cutrona, 1980) and the Rasch-Type Loneliness Scale (RTLS; De Jong Gierveld & Kamphuis, 1985), have not explicitly been developed to tap into a specific loneliness type, either. Based on item content, these scales tap into both intimate and relational loneliness. None of the six established measures tap into collective loneliness. For researchers who want to assess loneliness, it is important to realize that different established loneliness measures may tap into different types of loneliness, even though they have not been developed as such.

In addition to knowing which measures tap into which type of loneliness, it is important to know how the different measures relate to each other if one wants to integrate or compare findings from studies using different loneliness instruments. Empirical findings on correlations among different loneliness measures are rare in the published literature, as most researchers simply select a single scale from the multitude of instruments available. The CLS showed higher correlations with group loneliness than dyadic loneliness, as measured by the PNDLS (r = .74 and r = .47, respectively; Hoza et al., 2000) in a sample of 200 early adolescents. A similar pattern of correlations was found between the CLS and group and dyadic loneliness, as measured by the RPLQ (weighted average across two studies: r = .70 and r = .47, respectively; Goossens & Beyers, 2002; Terrell-Deutsch, 1993), based on a total of 1,200 children. Similarly, the peer-related loneliness subscale of the LACA showed higher correlations with group

loneliness than dyadic loneliness, as measured with the RPLQ (weighted average across two studies: r = .59 and r = .38, respectively; Goossens & Beyers, 2002; Terrell-Deutsch, 1993). The peer-related loneliness subscale of the LACA was further highly correlated with the CLS (weighted average across three samples: r = .70; Goossens & Beyers, 2002). No study has documented correlations between the subscales of the PNDLS and the RPLQ.

The UCLA and the RTLS proved highly correlated in 200 university students (r = .74; Cramer & Barry, 1999). They were also related to the peer-related loneliness subscale of the LACA in 500 adolescents (r = .76 and r =.65, respectively; Goossens et al., 2009). The UCLA was further related to both PNDLS subscales (about r = .70; Lasgaard, 2007) in a sample of 300 adolescents. No such data are available for the RTLS or regarding correlations with the other loneliness scales.

This fragmented picture of the correlations among extant loneliness measures poses a problem for researchers who wish to compare or integrate findings across studies that use different loneliness measures. A comparison across studies will be more meaningful when researchers know how the different measures relate to each other. As there are no known correlations between the two most popular loneliness measures, that is, the UCLA Loneliness Scale and the CLS, for instance, it is unclear whether the findings obtained with the two instruments can be compared (Koenig & Abrams, 1999).

1.4 Gender differences in intimate and relational loneliness

Gender differences in loneliness have frequently been examined, but yielded inconsistent results (Weeks & Asher, 2012). As gender differences may vary according to loneliness type, this may be one explanation for this observed inconsistency. Substantial differences in peer experiences have been found between girls and boys. Girls tend to orient more toward dyadic, intimate attachments, whereas boys tend to orient more toward the larger group (Baumeister & Sommer, 1997; Gardner & Gabriel, 2004). Similarly, girls' peer relationships have been found to be more intense and exclusive than those of boys, whereas boys' peer groups have been found to be larger than girls' peer groups (Rose & Rudolph, 2006). Because girls focus more on intimate relationships, they might experience less intimate loneliness than boys. Similarly, because boys focus more on the group, they might experience less relational loneliness than girls. However, one could also argue that precisely because girls value dyadic relationships, they are especially vulnerable in this regard and may experience

more intimate loneliness than boys. Similarly, boys may be especially vulnerable to experiencing relational loneliness, as they value the group more than do girls.

Empirical support for these opposing hypotheses is limited. In line with the first line of reasoning, one study found that boys reported higher dyadic loneliness than did girls on the PNDLS (Hoza et al., 2000). No results on gender differences are available for the RPLQ. Gender differences in loneliness as measured by the other scales have also been examined, but results are largely inconsistent. For example, studies using the peer-related loneliness scale of the LACA have found no gender differences (Marcoen et al., 1987), higher scores for girls (Corsano, Majorano, & Champretavy, 2006), and higher scores for boys (Scharf, Wiseman, & Farah, 2011).

1.5 The present study

The present study examined the associations among the six most commonly used loneliness instruments in adolescent samples. Assuming overall comparability among similar measures within each category, that is, intimate and relational loneliness, one can expect a particular pattern of correlations to emerge. All correlations can be expected to be high, except for the "cross-correlations" among the two types of loneliness. This pattern of correlations, in turn, would translate into a two-factor structure, with one factor identifiable as intimate loneliness (i.e., with high loadings for the intimate loneliness subscales of the PNDLS and the RPLQ) and the other one as relational loneliness (i.e., with high loadings for the relational loneliness subscales of the PNDLS and the RPLQ, for the peer-related loneliness subscale of the LACA, and for the CLS). The two general measures, the UCLA Loneliness Scale and the RTLS, were expected to show substantial loadings on both factors.

In addition, we examined gender differences for the different loneliness measures. Based on the existing literature, we tentatively expected girls to score higher than boys on measures of relational loneliness, and boys to score higher than girls on measures of intimate loneliness. Before conducting these analyses of mean-level gender differences, we checked whether each of the measures showed measurement invariance across gender. To meaningfully compare the mean scores on these measures, both metric and scalar invariance should be established (Chen, 2007; Van de Schoot, Lugtig, & Hox, 2012). When scalar invariance is established, researchers can be confident that girls and boys interpret the items in the measure in similar ways.

2. Method

2.1 Participants

Data were collected in 2010 in a secondary school in the Dutch-speaking part of Belgium. This school offered both the academic and technical track, from which 14 classes were randomly selected. In all, 289 adolescents filled out the questionnaires, but 7 of them had missing data for one or more subscales and were therefore dropped from the current analyses. Of the remaining adolescents, 253 (89.7%) had complete data, whereas the others were missing one (8.2%) or a few items (2.2%). Little's MCAR Test (Little, 1988) revealed a normed χ^2 of 1.08, which according to guidelines by Bollen (1989) indicates that the data were missing completely at random. Therefore, we imputed missing values by means of the Expectation–Maximization procedure in SPSS 22.0.

The final analytic sample comprised 282 adolescents from Grade 7 (n = 143) and Grade 8 (n = 139). Participants were between 12 and 15 years old (M = 12.65, SD = 0.63). As regards gender, there were 114 boys (40.4%) and 168 girls (59.6%). Exact information on the ethnic background or the socioeconomic status of the students was not available, but the school is known to attract mostly Caucasian students with a middle class socioeconomic background.

2.2 Measures

The participants filled out eight subscales of six established loneliness questionnaires that are described below. All measures were in Dutch, the students' native language. For each of the six questionnaires, measurement invariance across gender was examined. Using Mplus 6.0 (Muthén & Muthén, 2007), metric invariance was examined by comparing the fit of a multigroup (i.e., girls and boys) CFA model without constraints to a multigroup CFA model in which the factor loadings were constrained to be equal across groups. Scalar invariance was examined by comparing the fit of a multigroup CFA model with only the factor loadings constrained to be equal across groups (cf. metric invariance) to a multigroup CFA in which both factor loadings and item intercepts were constrained to be equal across groups. To evaluate model fit, we relied on three commonly used fit indices (Chen, 2007; Vandenberg & Lance, 2000), that is, the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean squared residual (SRMR). Following the guidelines of Chen (2007), we regarded metric invariance as established if the difference in CFI (ΔCFI) between models with group-specific or common factor loadings was smaller than .010,

ΔRMSEA was smaller than .015 and ΔSRMR was smaller than .030. We regarded scalar invariance as established if ΔCFI, ΔRMSEA and ΔSRMR between models with group-specific or common intercepts were smaller than .010, .015 and .010, respectively.

Peer Network and Dyadic Loneliness Scale (PNDLS). The PNDLS (Hoza et al., 2000) is developed for children and comprises two 8-item subscales that tap into intimate and relational loneliness, as experienced within the peer context. The response format is modeled after Harter's (1985) Self-Perception Profile for Children (SPPC), which is meant to minimize the effects of social desirability response sets. The respondents are presented with pairs of sentences describing children who differ in friendships or network relationships. They are first asked to select which type of children they resemble most and then to indicate whether the description selected is *sort of true* or *really true* for them. Essentially, all items were answered on a 4-point scale ranging from (1) *very low* to (4) *very high*. The term "kids" was replaced with the more age-appropriate "youth". A sample item for the Peer dyadic loneliness subscale is "Some youth have someone their age who is a really close friend BUT Other youth don't have anybody their age who is a really close friend". A sample item for the Peer network loneliness subscale is "Some youth feel like they really fit in with other youth BUT Other youth don't feel like they fit in very well with other youth". Earlier research showed a high level of internal consistency for both subscales (i.e., α = .80) and a two-factor structure (Hoza et al., 2000). In the current sample, Cronbach's alpha was good for the two subscales (in both cases α = .85). We established both metric invariance (ΔCFI = .007, ΔRMSEA = .001, and ΔSRMR = .016) and scalar invariance (ΔCFI = .009, ΔRMSEA = .001, and ΔSRMR = .004) of the 2-factor model across gender.

Relational Provisions Loneliness Questionnaire (RPLQ). The RPLQ (Hayden, 1989) is a 28-item multidimensional scale developed for children. In the present study, only the peer personal intimacy (e.g., "I have a friend I can tell everything to") and the peer group integration (e.g., "I feel in tune with other youth") subscales were included. Both scales comprise 7 items, which can be answered on a 5-point scale ranging from (1) *not at all* to (5) *always*. In earlier research, all RPLQ subscales have shown high internal consistency (i.e., α > .80; Terrell-Deutsch, 1999) and substantial concurrent validity (McDougall & Hymel, 1998; Rubin, Chen, McDougall, Bowker, & McKinnon, 1995). Cronbach's alpha in the current sample was good for both the Peer personal intimacy subscale (α = .86) and the Peer group integration subscale (α = .90). We established both metric invariance (ΔCFI = .001, ΔRMSEA = .004, and ΔSRMR

= .006) and scalar invariance (ΔCFI = .006, ΔRMSEA < .001, and ΔSRMR = .003) of the 2-factor model across gender.

Children's Loneliness Scale (CLS). The CLS (Asher & Wheeler, 1985) is a 16-item unidimensional scale developed for children examining feelings of loneliness in the school context. Example items are "I get along with other kids" (reverse coded) and "I don't have any friends". Each item can be answered on a 5-point scale ranging from (1) *not at all* to (5) *always*. Earlier research indicated that the measure exhibits a high level of internal consistency (i.e., α > .80; Asher, Hymel, & Renshaw, 1984). Cronbach's alpha in the current sample was good (α = .91). We established both metric invariance (ΔCFI = .001, ΔRMSEA = .004, and ΔSRMR = .010) and scalar invariance (ΔCFI < .001, ΔRMSEA = .003, and ΔSRMR = .001) of the 1-factor model across gender.

Loneliness and Aloneness Scale for Children and Adolescents (LACA). The LACA (Marcoen et al., 1987) is a 48-item multidimensional scale developed for children and adolescents. In the present study, only the peer-related loneliness subscale (e.g., "I feel abandoned by my friends") was included. This subscale consists of 12 items, which can be answered on a 4-point scale ranging from (1) *never* to (4) *often*. In earlier research, the peer subscale has shown high internal consistency (i.e., α > .80; Maes, Van den Noortgate, & Goossens, 2015) and factorial validity (Maes, Klimstra, Van den Noortgate, & Goossens, 2015). Cronbach's alpha in the current sample was good (α = .92). In line with previous research (Maes, Klimstra, et al., 2015), we established both metric invariance (ΔCFI = .001, ΔRMSEA = .004, and ΔSRMR = .012) and scalar invariance (ΔCFI = .005, ΔRMSEA = .001, and ΔSRMR = .004) of the 1-factor model across gender.

UCLA Loneliness Scale (UCLA). The UCLA (Russell et al., 1980) is a 20-item unidimensional scale, originally developed for use with college students and adults. The scale also has been used and validated in research with adolescents. Example items are "There is no one I can turn to" and "I feel part of a group of friends" (reverse coded). Each item can be answered on a 5-point scale ranging from (1) *completely disagree* to (5) *completely agree*. Earlier research indicated that the measure shows a high level of internal consistency (i.e., α > .80; Vassar & Crosby, 2008). Cronbach's alpha in the current sample was good (α = .88). In line with previous research (Allen & Oshagan, 1995; Goossens, Klimstra, Luyckx, Vanhalst, & Teppers, 2014), we established both metric invariance (ΔCFI = .004, ΔRMSEA < .001, and

ΔSRMR = .010) and scalar invariance (ΔCFI = .017, but ΔRMSEA = .001, and ΔSRMR = .002) of the 1-factor model across gender.

Rasch-Type Loneliness Scale (RTLS). The RTLS (De Jong Gierveld & Kamphuis, 1985) is an 11-item scale for adults, developed as a multidimensional scale, but used primarily as a unidimensional scale. This scale has occasionally been used with adolescents. Example items are "I wish I had a really close friend" and "I miss having people around me". Each item can be answered on a 5-point scale ranging from (1) *completely disagree* to (5) *completely agree*. Earlier research showed a high level of internal consistency (i.e., $\alpha > .80$) in a sample of 2,900 older adults (Dykstra, Van Tilburg, & De Jong Gierveld, 2005). Cronbach's alpha in the current sample was good ($\alpha = .86$). We established both metric invariance (ΔCFI = .006, ΔRMSEA = .001, and ΔSRMR = .017) and scalar invariance (ΔCFI = .026, but ΔRMSEA = .010, and ΔSRMR = .010) of the 1-factor model across gender.

2.3 Procedure

After the school principal gave permission to conduct the study, parents were informed about the purpose of the study and could indicate in writing that they did not want their child to participate in the study (i.e., a passive form of parental consent was used). This procedure was approved by the Institutional Review Board (IRB) at the researchers' institution. Only three parents did not give their consent for their child to participate in the study. At the start of each testing session, participants were informed that the anonymous answers would be treated confidentially and that they could refuse to participate further at any time if they so desired. None of the participants opted to do so. Adolescents completed the questionnaires during regular classes that were supervised by an undergraduate student in psychology.

2.4 Plan of analysis

To examine whether the different loneliness subscales reflect the two hypothesized dimensions of loneliness, we conducted confirmatory factor analyses in Mplus 6.0 (Muthén & Muthén, 2007). To evaluate model fit, the use of multiple criteria has been advocated by Vandenberg and Lance (2000), as different criteria can provide information on different sources of model misspecification. Because the χ^2-statistic is well known to be overly sensitive to sample size and model complexity (e.g., Cheung & Rensvold, 2002), we relied on three other commonly used fit indices (Chen, 2007), that is, the comparative fit index (CFI), the standardized root mean squared residual (SRMR), and the Akaike information criterion (AIC).

The χ^2-value should be as low as possible and preferably non-significant. As regards CFI .90 represents acceptable fit and .95 good fit. SRMR should not be larger than .08 in well-fitting models, and AIC should be as low as possible (Hu & Bentler, 1999). To examine gender differences on the eight loneliness subscales, we conducted a multivariate analysis of variance (MANOVA).

3. Results

Descriptive statistics and intercorrelations of the eight loneliness subscales are presented in Table 4.1. Correlations among measures that reflect intimate loneliness (i.e., PDLS and PPI) and among measures that reflect relational loneliness (i.e., PNLS, PGI, CLS, and L-Peers) were generally high (*r* ranged from .73 to .84). As expected, correlations between measures reflecting intimate loneliness and measures reflecting relational loneliness were somewhat lower (*r* ranged from .45 to .60). The two measures that tap into both intimate and relational loneliness, that is, the UCLA and RTLS, correlated highly with all other measures (*r* ranged from .64 to .87).

3.1 Intimate and relational loneliness

A 1-factor model was tested in which all subscales loaded on this single factor. In addition, we tested a 2-factor model, with unique loadings on the Intimate loneliness factor for the PDLS and PPI and on the Relational loneliness factor for the PNLS, PGI, CLS, and L-Peers. The UCLA and RTLS could load on both factors, because these scales reflected both intimate and relational loneliness in their item wordings. The two factors correlated substantially ($r = .73$, $p < .001$). Both models showed acceptable fit, but the model fit indices of the 2-factor model proved superior to the 1-factor model. Fit indices are presented in Table 4.2.

Factor loadings of the loneliness scales for both models tested are presented in Table 4.3. The subscales PDLS and PPI loaded highly on intimate loneliness, and the subscales PNLS, PGI, CLS, and L-Peers loaded highly on relational loneliness (i.e., all above .80). The two other subscales, that is, the UCLA and RTLS, loaded on both factors, but stronger on relational loneliness.

Table 4.1

Descriptive Statistics and Intercorrelations for the Eight Loneliness Subscales

Subscale	*M*	*SD*	1	2	3	4	5	6	7
1. PNLS	13.32	4.30	-						
2. PDLS	12.56	4.63	.59	-					
3. PGI	13.73	5.03	.76	.59	-				
4. PPI	11.98	5.29	.45	.73	.59	-			
5. CLS	26.94	9.85	.78	.55	.83	.55	-		
6. L-Peers	19.36	7.31	.80	.60	.77	.52	.84	-	
7. UCLA	36.15	10.90	.80	.71	.78	.65	.79	.83	-
8. RTLS	19.74	7.62	.74	.71	.77	.64	.76	.82	.87

Note. PNLS = Peer Network Loneliness Scale; PDLS = Peer Dyadic Loneliness Scale; PGI = Peer Group Integration; PPI = Peer Personal Intimacy; CLS = Children's Loneliness Scale; L-Peers = Peer-Related Loneliness; UCLA = University of California Los Angeles Loneliness Scale; RTLS = Rasch-Type Loneliness Scale. All correlations were significant ($p < .001$).

Table 4.2

Fit Indices for two Factorial Models

Model	*df*	χ^2	CFI	SRMR	AIC
One-factor model	20	231.90	.91	.05	12749.06
Two-factor model	17	87.46	.97	.02	12610.62

Note. CFI = Comparative fit index; SRMR = Standardized root mean squared residual; AIC = Akaike's information criterion. All chi-squares were significant ($p < .001$).

3.2 Gender differences in loneliness scores

Because we could establish scalar invariance across gender for all loneliness measures, we proceeded to examine gender differences on the eight subscales. The MANOVA with the eight subscales as dependent variables showed a significant gender difference, $F(8, 273) = 8.10$, $p < .001$, $\eta^2_p = .19$. Subsequent univariate ANOVAs, as presented in Table 4.4, revealed significant gender differences for the subscales PNLS and PPI. On average, girls scored higher

than boys on the PNLS, whereas boys scored higher than girls on the PPI. Effect sizes, however, were rather small.

Table 4.3

Factor Loadings of the Loneliness Measures

	One-Factor Model	Two-Factor Model	
Subscale	Loneliness	Intimate loneliness	Relational loneliness
PNLS	.85		.87
PDLS	.73	.88	
PGI	.87		.87
PPI	.66	.81	
CLS	.88		.90
L-Peers	.90		.92
UCLA	.93	.35	.65
RTLS	.91	.38	.60

Note. PNLS = Peer Network Loneliness Scale; PDLS = Peer Dyadic Loneliness Scale; PGI = Peer Group Integration; PPI = Peer Personal Intimacy; CLS = Children's Loneliness Scale; L-Peers = Peer-Related Loneliness; UCLA = University of California Los Angeles Loneliness Scale; RTLS = Rasch-Type Loneliness Scale.

Table 4.4

Loneliness Scores as a Function of Gender

	Girls		Boys			
Subscale	*M*	*SD*	*M*	*SD*	$F(1, 280)$	η^2_p
PNLS	13.76	4.79	12.69	3.39	4.25*	.02
PDLS	12.13	4.64	13.20	4.57	3.66	.01
PGI	13.98	5.16	13.36	4.85	1.01	.00
PPI	10.75	4.41	13.79	5.93	24.26***	.08
CLS	27.37	10.18	26.30	9.37	0.79	.00
L-Peers	20.06	7.66	18.33	6.68	3.82	.01
UCLA	36.26	11.64	35.99	9.75	0.04	.00
RTLS	19.98	7.92	19.39	7.18	.53	.00

* $p < .05$. ** $p < .01$. *** $p < .001$.

4. Discussion

The present study provides empirical evidence for the recently proposed overarching framework on different types of loneliness (Cacioppo, Grippo et al., 2015). Although no loneliness measures have been developed based on this framework, we could categorize the six most commonly used loneliness instruments in adolescent samples as tapping into intimate or relational loneliness. Most of these loneliness measures showed high inter-correlations, both within and across the categories distinguished, including some measures that had never been used together in a single study. At the same time, confirmatory factor analysis indicated that a distinction could be made, as expected, between intimate and relational loneliness. Gender differences were only found for two of the subscales, with boys scoring higher on intimate loneliness as measured by the RPLQ and girls scoring higher on relational loneliness as measured by the PNDLS.

To interpret findings from studies using different loneliness instruments, it is important to know which type of loneliness is captured by which measure and how these measures relate to each other. Moreover, it is important to know which instrument taps into which type of loneliness, when selecting an instrument. Researchers who want to study the type of loneliness that results from poor relationships with a best friend may opt for a measure reflecting intimate loneliness (i.e., the intimate loneliness subscale of the PNDLS or RPLQ). Researchers who want to concentrate on the type of loneliness that results from a less successful integration into the peer group may be advised to use a measure reflecting relational loneliness (i.e., the CLS, the LACA-Peers, or the relational loneliness subscale of the PNDLS or RPLQ). Other researchers who are less interested in specific types of loneliness and who wish to administer one scale tapping into general loneliness, would be well-advised to use global measures of the construct, such as the UCLA or the RTLS. Strikingly, neither of the two most popular loneliness measures, that is, the UCLA and the CLS, have been explicitly developed to tap into either intimate or relational loneliness, or have been thought of as such. The present results showed that whereas the UCLA covers both types of loneliness, the CLS tends to focus on relational loneliness only. When comparing results across studies using these measures, researchers are advised to keep this difference in mind.

Moreover, the present findings have implications for researchers who want to conduct meta-analyses in the domain of loneliness. One could argue that all measures used in the present

study can be incorporated in such quantitative reviews of the literature, without making a distinction between measures, as the 1-factor model showed a good fit and all correlations were medium to high in size (i.e., *r* ranges between .45 and .87). However, the fit of the 2-factor model was somewhat better and correlations between measures tapping into the same type of loneliness were large for intimate loneliness (r = .73) and relational loneliness (r ranges between .76 and .84). Thus, in addition to looking at an overall loneliness score, researchers may want to zoom in on the two types of loneliness, for example, by performing a multivariate meta-analysis that includes the type of loneliness measure as a potential moderator.

Regarding gender differences in loneliness, our expectations were partly confirmed. Boys scored higher on intimate loneliness (but only when measured with the RPLQ), whereas girls scored higher on relational loneliness (but only when measured with the PNDLS). However, the results were not consistent across measures and effect sizes were rather small. Thus, at this moment, there is insufficient evidence to conclude that there are gender differences in loneliness. To gain more insight into gender differences in loneliness, a meta-analysis would be the ideal method as it synthesizes findings across several studies (Hyde, 2005).

The present study has a number of limitations, leading to suggestions for future research. Most importantly, the third type of loneliness as hypothesized by the model by Cacioppo, Grippo et al. (2015), that is collective loneliness, has not received much attention in the literature yet. Only one scale exists that taps into this type of loneliness, that is, the Differential Loneliness Scale (DLS; Schmidt & Sermat, 1983). This scale, however, has only been administered once in an adolescent sample. We suggest future research to examine the validity and reliability of this scale in an adolescent sample, and to examine its relation with intimate and relational loneliness. Furthermore, future research is needed on the conceptual level, as it is not clear yet whom can be understood as "similar others at a distance" – which is provided as definition of collective loneliness. These "others at a distance" might include different contexts and likely change with age. For example, for children, this context might include the school, whereas for adolescents, the neighborhood or the larger cultural group might be more important. As such, we suggest future research to specify the definition of collective loneliness, bearing in mind developmental differences.

Another limitation of the present study is that the research was conducted in a single school in a specific country on a sample of mainly Caucasian adolescents. Thus, our results

may not generalize to other countries or to adolescents with a different ethnic background. Furthermore, our study only examined adolescents in Grades 7 and 8 and care should be taken, therefore, not to extend our findings to other developmental periods. For example, the association found between the UCLA and CLS in this age group, does not necessarily mean that the two scales are similarly associated with each other when used in different age groups. Items from a particular questionnaire may be interpreted in a different way by different age groups. A next step, therefore, is to establish measurement invariance of loneliness measures across development. Another limitation of the present study is that the participants filled out the questionnaires in the same order, so we cannot rule out order effects. Reliability scores, however, did not show a particular pattern across these measures and were in fact high for all scales (ranging from .85 to .92).

Finally, in the present study, we have focused on the peer context, but other loneliness measures that are used in adolescence focus more on other contexts, such as the family. Within the family context, a distinction between group and dyadic loneliness can also be made. Some measures have been developed to tap into loneliness regarding a specific family member (cf. intimate loneliness), including a subscale from the RPLQ. Other measures tap into loneliness regarding the family as a whole (cf. relational loneliness), such as subscales from the RPLQ, the DLS, and the Social and Emotional Loneliness Scale for Adults (SELSA; DiTommaso & Spinner, 1993). An interesting pathway for future research, therefore, is to test intimate and relational loneliness across different measures in the family context.

To summarize, the present study clearly indicates that the different loneliness measures that are commonly used in adolescent samples are related to one another and that two types of loneliness, that is, intimate and relational loneliness in the peer context, can be distinguished. The key distinction between loneliness as it emerges within the dyadic context of friendship and the broader context of the peer group may guide the selection of scales in future research in a more consistent and deliberate manner and may assist researchers who wish to compare or integrate findings from studies using different loneliness measures.

Part 2

Examining Psychometric Properties of a Multidimensional Loneliness Measure

Ich fliehe nicht die Nähe der Menschen: gerade die Ferne, die ewige Ferne zwischen Mensch und Mensch treibt mich in die Einsamkeit.

(Friedrich Nietzsche)

5

Reliability Estimates

Across Gender, Age, and Cultural Groups

Maes, M., Van den Noortgate, W., & Goossens, L. (2015). A reliability generalization study for a multidimensional loneliness scale: The Loneliness and Aloneness Scale for Children and Adolescents. *European Journal of Psychological Assessment, 31,* 294-301. doi:10.1027/1015-5759/a000237

Abstract

Research on the average reliability and factors that affect the reliability of loneliness scales has been restricted to unidimensional measures. A reliability generalization (RG) study was conducted for a multidimensional loneness measure, that is, the Loneliness and Aloneness Scale for Children and Adolescents (LACA). Multilevel meta-analyses were performed on 79 studies that comprised 92 samples (for a total of 41,076 participants). Average reliability (Cronbach's alpha) across samples was good (i.e., .80 or above) for all four subscales. Studies with higher sampling quality yielded slightly higher alphas for one of the subscales (i.e., Parent-related loneliness). For adolescents, as compared to children, alphas were somewhat lower for three of the four subscales and higher for the Affinity for aloneness subscale. Suggestions for future research are outlined. From a reliability perspective, the LACA is a good option for researchers who want to use a multidimensional loneliness measure with children and adolescents.

1. Introduction

The reliability of an instrument's test scores is important for both academics and practitioners. For academics, low reliability scores may seriously affect the ability of a study to detect statistical significance (Thompson, 2003). In each individual study, therefore, academics have to judge the impact of the reliability of the instrument's scores on the findings obtained. Practitioners, for their part, may need to interpret an individual's test score, using the confidence interval around that score. To obtain these intervals, the standard error of measurement (SE*m*) is needed, which is computed using the reliability coefficient. In all these applications, by academics and practitioners alike, the reliability estimates of a large norm group are often used. Reliability, however, is not a characteristic of an instrument and may vary across studies that administered the test with a certain protocol to certain participants on certain occasions (Thompson, 1992). The present study will shed light on the reliability of loneliness scores obtained with the Loneliness and Aloneness Scale for Children and Adolescents (LACA; Marcoen, Goossens, & Caes, 1987) administered in a diverse set of contexts, enabling us to examine whether there are certain contexts in which the LACA functions less adequately.

1.1 Reliability generalization

To gain some insight in the expected degree of reliability of test scores for a given instrument, a Reliability Generalization (RG; Vacha-Haase, 1998) study can be conducted. The RG methodology enables researchers to examine the range of reliability scores that have appeared in the literature, but also to compute an estimated mean reliability across these studies. Furthermore, RG can help explain variation in reliability estimates by examining how the reliability scores are related to characteristics of the instrument itself, the sample under investigation, or the context in which the study took place (Bonett, 2010). Examples of such explanatory factors include the number of test items, but also participants' age and gender (Vacha-Haase & Thompson, 2011). The explanatory factors, or moderators, examined in this study included eight substantive characteristics (i.e., language, percentage male, age group, study focus, original vs. non-original format of the instrument, publication status, sampling quality, and study design) and two statistical characteristics (i.e., sample mean and variance).

Demonstrating a high mean reliability score with low variability across contexts considerably increases our confidence in the legitimate use of that particular instrument. In the present study, we concentrated on a particular type of reliability estimate, Cronbach's alpha

(Cronbach, 1951), for measures of loneliness in a specific age range, that is, childhood and adolescence. More specifically, we applied the RG methodology to a multidimensional loneliness measure, that is, the LACA (Marcoen et al., 1987).

1.2 Loneliness: Conceptualization and measurement

Loneliness is a universal phenomenon resulting from a perceived discrepancy between the actual and desired levels of both the quantity and quality of one's relationships (Perlman & Peplau, 1981). Feelings of loneliness have a negative effect on children's and adolescents' mental and physical well-being (Heinrich & Gullone, 2006). To measure this important construct, two different conceptualizations have been developed (Russell, 1982).

Researchers advocating a *unidimensional* conceptualization view loneliness as a unitary concept that may vary in intensity and they frequently use the revised version of the loneliness scale developed at the University of California at Los Angeles (UCLA-R; Russell, Peplau, & Cutrona, 1980). Researchers adhering to a *multidimensional* conceptualization aim to differentiate among various hypothesized manifestations of loneliness. Loneliness experiences, for example, likely take on a different form in different relationships, such as in relationships with peers or parents. Three multidimensional loneliness measures are available that focus on relation-specific types of loneliness. The Differential Loneliness Scale (DLS; Schmidt & Sermat, 1983), designed for use with college students and adults, distinguishes among romantic-sexual relationships, friendships, relationships with family, and relationships with larger groups or communities. The Social and Emotional Loneliness Scale for Adults (SELSA; DiTommaso & Spinner, 1993), again primarily designed for use with college students and adults, distinguishes among romantic relationships, friendships, and relationships with family. Finally, the LACA (Marcoen et al., 1987), designed for use with children and adolescents, distinguishes between relationships with peers and with parents.

Considerable variability in internal consistency has been found for both unidimensional and multidimensional measures of loneliness. The only RG study to date on a loneliness measure found alphas to range from .53 to .95 for the unidimensional UCLA-R (Vassar & Crosby, 2008). Inspection of the literature reveals that for the peer-related loneliness subscale of the LACA, for example, a Cronbach's alpha of .87 was found in the original publication (Marcoen et al., 1987) and an estimate as low as .66 in later work (Qualter, Brown, Munn, & Rotenberg, 2010).

The present study concentrated on the LACA, as it was the only multidimensional measure for which an RG study could be conducted across our self-selected age range of childhood and adolescence. Neither the DLS nor the SELSA were designed for use with children.

1.3 The Loneliness and Aloneness Scale for Children and Adolescents

The LACA is a 48-item scale intended for use in the age range of 10 to 19 years (Marcoen et al., 1987). The instrument measures two relation-specific types of loneliness, that is, parent-related loneliness (L-Part, e.g., "I feel left out by my parents") and peer-related loneliness (L-Peers, e.g., "I feel sad because I have no friends"). An additional strength of the LACA is that it also assesses a person's attitude toward aloneness. Two clusters of reactions toward social isolation have been identified, that is, aversion to being alone (A-Neg, e.g., "When I am alone, I feel bad") and affinity for being alone (A-Pos, e.g., "I want to be alone"). Previous research has included these attitudes toward aloneness to place feelings of loneliness in a somewhat broader perspective (e.g., Larson, 1997; Marcoen & Goossens, 1993). For example, when someone scores relatively high on aversion to aloneness, he or she may more easily feel lonely when being alone. Each of these four subscales consists of 12 items, that can be answered on a 4-point scale ranging from *often* to *never*. In the LACA manual (Goossens, 2016), Cronbach's alphas in the norm group (N = 9,676; aggregated across 30 samples) were .89 (L-Part), .88 (L-Peers), .79 (A-Neg), and .83 (A-Pos).

The present study aimed to examine the reliability of scores obtained by the LACA administered in a diverse set of contexts. First, we estimated the mean reliability scores of the four LACA subscales based on all studies that have included the LACA. Second, we examined the role of sample and study characteristics as moderators of the internal consistency of the instrument.

2. Method

2.1 Literature search

The literature search was performed using five databases, that is, PsychINFO, ERIC, PubMed, ProQuest Dissertations, and the local university search engine. Search strings that were used included "*loneliness and aloneness scale for children and adolescen**" and *"(LLCA OR LACA OR LEKA) AND (lonel* OR perceived social isol*)*". This literature search resulted

in 81 hits. Of those 81 hits, 28 were identified as duplicates and 20 were excluded as irrelevant based on the abstract, resulting in 33 relevant studies. To avoid publication bias, we further checked the reference lists of the studies obtained, contacted experts in the field, and examined the manual of the LACA (Goossens, 2016). This yielded an additional 114 studies, mainly unpublished master's theses, resulting in a total of 147 studies.

2.2 Inclusion and exclusion criteria

Studies were included if they (a) used the LACA, (b) focused on children and/or adolescents, (c) were written in a language that the authors of this study could understand (i.e., Dutch, English, French, German, Italian, Portuguese, or Spanish), and (d) reported Cronbach's alpha as computed on the study's sample. Despite initial indications, it turned out that four studies did not use the LACA. These four studies, together with a study that could not be retrieved, were excluded from the database. Six studies were deleted, because they focused on university students. Furthermore, in 11 studies, Cronbach's alpha was not reported or computed. Authors of journal articles were asked to provide Cronbach's alpha for the LACA subscales and all but one effectively did so. Finally, to ensure that the reliability estimates were derived from independent samples, we scrutinized studies conducted by the same author(s). Based on this review, 51 studies were identified as duplicates and were excluded.

2.3 Data set

Our final data set consisted of 79 studies from 1987 to 2014, reporting Cronbach's alphas for 92 samples (*k*). In all, 321 Cronbach's alphas (*N*α) were collected for the four subscales L-Part (n_α = 77), L-Peers (n_α = 88), A-Neg (n_α = 78), and A-Pos (n_α = 78). The final data set consisted of 23 journal articles, 4 book chapters, 46 master's theses, 1 dissertation, 3 conference papers and internal reports, and 2 data files. For the large majority of samples, a cross-sectional design was used (*k* = 82), and in a few cases an experimental (*k* = 1) or a longitudinal (*k* = 9) design. Originally, the LACA was developed in Belgium and written in Dutch, which is reflected in the current data set with 65 samples from Belgium and 5 from the Netherlands (the neighboring country where Dutch is the official language). Meanwhile, the LACA has been adapted and translated in numerous languages (i.e., Arabic, Chinese, English, Greek, Hebrew, Italian, Spanish, and Portuguese), resulting in samples from 11 countries. Sample sizes varied from 106 to 5,862 participants. In all, 41,076 children and adolescents were included in the present meta-analyses, 48% of which were male. Samples included children,

that is, elementary school students (k = 35) and adolescents, that is, secondary school students (k = 57). Furthermore, samples were categorized as nonclinical (k = 90) or mixed (i.e., comprising both clinical and nonclinical participants; k = 2). Clinical syndromes comprised autism spectrum, motor and/or sensory disabilities, and learning disabilities with or without attention deficit hyperactivity disorder. Most studies did not report participants' ethnicity or SES. The few studies that did provide some information included a vast majority of Caucasian middle class participants.

2.4 Coding of studies

Based on earlier RG work on the UCLA-R (Vassar & Crosby, 2008), we selected five substantive characteristics, that is, language, percentage male, age group, study focus, and original vs. non-original format of the instrument. We further added three substantive characteristics that were not coded in that earlier work, but proved relevant for the present study. These characteristics were publication status, sampling quality, and design. Papers that were coded as having low sampling quality were papers that included samples from one school in one city in one area. In all other cases (i.e., when samples came from several areas, cities, or schools), this was coded as 'other'. The coding of the eight substantive characteristics can be found in Table 5.1. Finally, as recommended by Rodriguez and Maeda (2006), we added two statistical moderators, that is, sample mean and variance (both coded as a continuous variable).

In most RG studies, no a priori hypotheses are phrased, as the primary intent of these studies is merely to check whether any of the characteristics selected have an impact on Cronbach's alpha. In their primary analysis, based on those samples for which the sample standard deviation was available, Vassar and Crosby (2008) found that samples with a higher standard deviation had a slightly higher alpha for the UCLA-R and that substantive articles yielded slightly higher alphas than did measurement articles. The first finding was in line with classical test theory, which states that, all other things being equal, samples with greater variances can be expected to have higher alphas. The second finding defied clear interpretation. In subsequent analyses, based on all samples, alpha was also slightly lower in adolescents (as compared to all other age groups) and in samples in which participants were separated from their social network (i.e., immigrants, elderly, and college students). The latter characteristic could not be coded in the present study, as most samples of participants effectively were well-connected to their social network.

2.5 Statistical analyses

Accounting for dependency. In the present study, a multilevel RG study was conducted, as several studies included more than one sample and reported on more than one reliability estimate. A multilevel meta-analysis does not make the strong assumption of independence that underlies traditional meta-analytic approaches, but explicitly accounts for a possible dependence (Hox, 2002; Van den Noortgate & Onghena, 2003). Ignoring the dependence may lead to misleading results, while avoiding dependence (e.g., by selecting just a single estimate) may result in a loss of information (Van den Noortgate, López-López, Marín-Martínez, & Sánchez-Meca, 2013). In the present multilevel RG study, the dependency among multiple reliability coefficients reported in the same study is modeled by adding an intermediate level: we have used a three-level model, accounting for sampling variance (i.e., Level 1; sampling variation for each observed alpha value), within-study variance (i.e., Level 2; variation of alpha values within a study), and between-study variance (i.e., Level 3; variation of alpha values over studies). Another source of dependency in our study is that participants often completed items of more than one subscale. Therefore, we performed meta-analyses for the four subscales separately. As a sensitivity analysis, we followed another way to account for this dependency, that is, we analyzed the alphas for all scales together using a robust variance estimation procedure as proposed by Hedges, Tipton, and Johnson (2010).

Publication bias. A common problem in meta-analyses is publication bias. To check for such bias, we inspected a funnel plot for each subscale. In addition to this visual inspection, we wanted to statistically test for publication by using three methods, that is, we calculated and tested Kendall's Tau, performed Egger's intercept test, and examined the moderating effect of publication status. Kendall's Tau is used to evaluate the correlation between a study's sample size and Cronbach's alpha. Unusual findings, for instance, when small samples correspond to higher Cronbach's alphas, may indicate publication bias. Egger's test is a comparable method that uses the actual values of Cronbach's alpha, rather than ranks. As a sensitivity analysis, we used the trim and fill method to correct for potential publication bias (Duval & Tweedie, 2000).

Statistical modeling. As Cronbach's alpha by its nature follows a skewed distribution, whereas the meta-analytic techniques we used assume a normal sampling distribution, we used the Bonett-transformation (Sánchez-Meca, López-López, & López-Pina, 2013). Further, we

used the formula given by Sánchez-Meca et al. (2013) to estimate the sampling variance of the Bonett-transformed alphas, which is necessary for obtaining confidence intervals and for the applied weighting method. Based on recommendations of Sánchez-Meca et al. (2013), the reliability coefficients were weighted by the inverse variance. This means that samples with higher precision (i.e., smaller variance, probably because of a larger sample size) get a greater weight in the analyses. In the current study, a mixed-effects meta-analytic model was used (Borenstein, Hedges, Higgins, & Rothstein, 2011) that assumes that the population value of Cronbach's alpha can vary from study to study and that its value may depend on the characteristics of that particular study.

In a first step, intercept-only models (i.e., models without predictors) were examined. In the next steps, predictors were entered in the model and moderator effects were investigated. Initially, all moderators were examined separately. Significant moderators in these analyses were then used to build the final model using both forward and backward stepwise methods. Analyses were conducted with the procedure Mixed from SAS 9.3 using restricted maximum likelihood (REML) as estimation method (Littell, Milliken, Stroup, Wolfinger, & Schabenberger, 2006). Mean and moderating effects were statistically tested by a Wald test, comparing the ratio of the estimate over the corresponding standard error estimate to a t-distribution, with degrees of freedom estimated using the Satterthwaite (1946) method. A likelihood ratio test was used for testing the (residual) heterogeneity between samples and between studies, before and after accounting for the moderators (Raudenbush & Bryk, 2002).

3. Results

3.1 Descriptive statistics

Descriptive statistics of the moderator variables are presented in Table 5.1 The moderator Publication bias was coded at the study level, whereas the other moderators were coded at the sample level, as reflected by the higher number of observations for these variables. The Variance inflation factors (VIF) did not indicate problems of multicollinearity (O'Brien, 2007). The correlations show that studies that used a translated version of the LACA were also likely to have used a non-original version. Furthermore, sampling quality was higher in samples including children than in samples of adolescents.

Table 5.1

Descriptive Statistics of and Correlations Among Moderator Variables

Variable	Coding	*N*	*M*	*SD*	VIF	1	2	3	4	5	6	7
1. Published	0 = no, 1 = yes	78	0.32	0.47	1.89	-						
2. Language scale	0 = non-Dutch, 1 = Dutch	91	0.77	0.42	1.77	-.31**	-					
3. Percentage male	Coded as continuous variable	90	0.48	0.11	1.16	.09	-.12	-				
4. Age group	0 = child, 1 = adolescent	92	0.59	0.50	1.22	.04	-.04	-.10	-			
5. Sampling quality	0 = lowest sampling quality, 1 = other	92	0.76	0.43	1.37	.08	.01	.13	-.11	-		
6. Design	0 = cross-sectional, 1 = other	92	0.11	0.31	1.23	.15	-.14	-.02	-.06	-.05	-	
7. Study focus	0 = psychometric, 1 = substantive	91	0.81	0.39	1.42	-.19	.00	.04	.22*	.21	.08	-
8. Original scale	0 = no, 1 = yes	92	0.86	0.35	1.90	-.44***	.56***	-.09	-.15	.07	.04	-.03

Note. L-Part = parent-related loneliness; L-Peers = peer-related loneliness; A-Neg = aversion to being alone; A-Pos = affinity for being alone.

VIF = Variance Inflation Factor.

* $p < .05$. ** $p < .01$. *** $p < .001$.

The descriptive statistics of the four subscales and their intercorrelations are presented in Table 5.2. On average, participants scored highest on the subscale aversion to being alone (M = 2.64, SD = 0.14). Mean variability in scores was roughly equal across the four subscales ranging from 0.46 to 0.53. Considerable variation of Cronbach's alpha was found across samples, with the largest range for the aversion to aloneness subscale (alpha ranging from .60 to .93). The means of the reported correlations among the subscales were positive and small to medium in size (r_M ranges from .05 to .34), except for the correlation between the two attitude scales. Figure 5.1 presents the distribution of Cronbach's alphas across samples.

Table 5.2

Descriptive Statistics of the Four Subscales

	Mean	*SD*	Alpha		Correlations		
					L-Part	L-Peers	A-Neg
Scale	*M (SD)*	*M (SD)*	*M (SD)*	*Range*	*M (SD)*	*M (SD)*	*M (SD)*
L-Part	1.65 (0.27)	0.46 (0.15)	.86 (.05)	.70–.93	–		
L-Peers	1.80 (0.17)	0.53 (0.18)	.87 (.04)	.66–.92	.22 (.10)	–	
A-Neg	2.64 (0.14)	0.46 (0.14)	.79 (.05)	.60–.93	.05 (.08)	.15 (.11)	–
A-Pos	2.58 (0.20)	0.46 (0.14)	.80 (.05)	.67–.90	.13 (.09)	.34 (.07)	-.02 (.17)

Note. L-Part = parent-related loneliness; L-Peers = peer-related loneliness; A-Neg = aversion to being alone; A-Pos = affinity for being alone. Means and standard deviations are based on the 96 samples.

3.2 Mean reliability

The intercepts of the intercept-only models reflect the estimated mean reliability (as displayed in Table 5.3). Back transformations of these values reveal mean Cronbach's alphas with 95% confidence intervals of .87 [.86, .88] for parent-related loneliness, .87 [.87, .88] for peer-related loneliness, .80 [.78, .80] for aversion to being alone, and .81 [.80, .82] for affinity for being alone. Further, for all subscales, except A-Pos, we found significant within-study variance. This means that there is variation among the obtained Cronbach's alphas, which might be explained by sample characteristics. It is thus legitimate to examine moderators that may explain this variability. For all subscales, except A-Neg, we found significant between-study variance. This means that samples within a study are more alike than samples from different

studies. It is necessary to take this dependency into account, as has been done in the multilevel model used.

In addition to the separate analyses for the four subscales, we used the robust variance estimator approach as proposed by Hedges et al. (2010). The results were virtually identical, so in the following, we will describe the results of the separate analyses only.

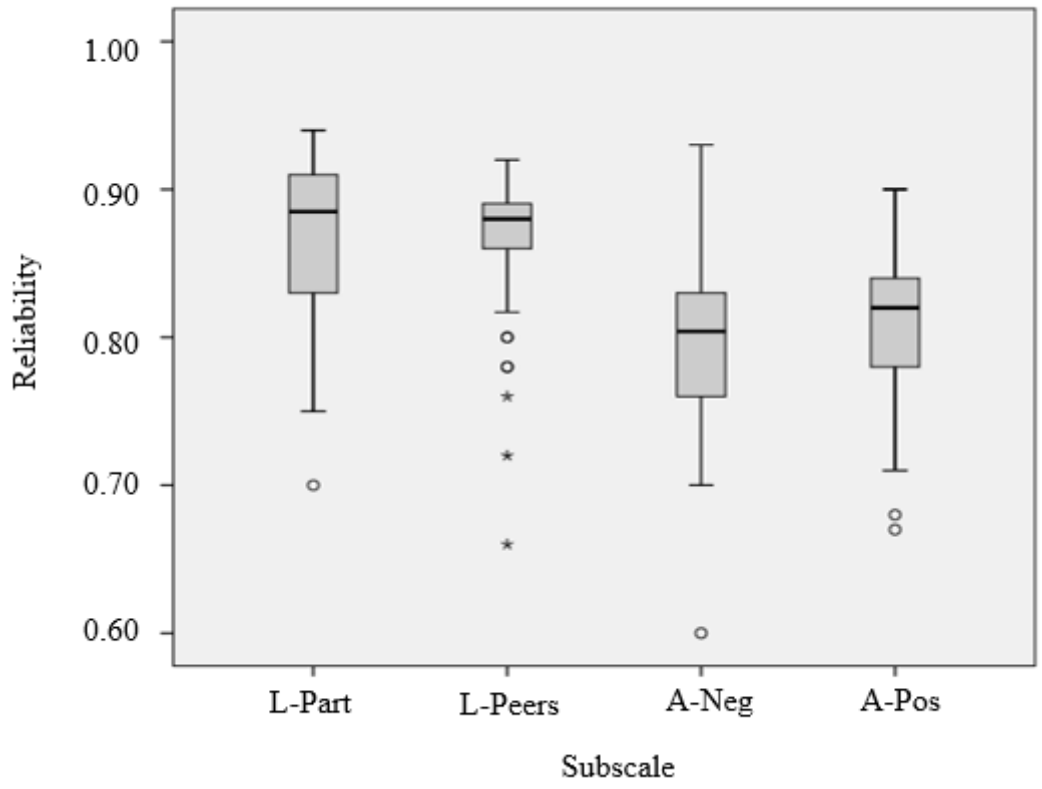

Figure 5.1. Box-and-whisker plot of the observed coefficient alphas for parent-related loneliness (L-Part), peer-related loneliness (L-Peers), aversion to being alone (A-Neg), and affinity for being alone (A-Pos).

3.3 Moderator effects

To examine moderating effects, the continuous predictors were centered around the mean with the exception of publication year, which was centered around the first year of publication. We then followed a two-step approach. First, the effect of each predictor was investigated separately. The results of these models including one moderator only are presented in Table 5.3. In order to save space, intercepts of these models are not presented. Significant

predictors were then used to build the final model (Table 5.4). Note that the Bonett transformation changes the sign of the effects. A negative regression coefficient thus actually means an increase in the estimated Cronbach's alpha with an increase of the predictor value. To facilitate interpretation, we added the back transformed estimates for predicted scores when all predictors are being zero (first line) or when only the predictor from that line is equal to 1. For example, regarding L-Peers, the predicted estimate of Cronbach's alpha for a non-Dutch study including children is .89, for a non-Dutch study including adolescents .89, and for a Dutch study including children .86.

Table 5.3

Separate Regression Analyses for the Individual Moderators Predicting the LACA Subscales

	L-Part		L-Peers		A-Neg		A-Pos	
Predictor	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept-only model	-2.04***	0.04	-2.07***	0.03	-1.59***	0.03	-1.66***	0.03
Published	-0.03	0.09	-0.17**	0.06	0.01	0.07	-0.05	0.06
Language scale	0.22*	0.10	0.31***	0.06	-0.05	0.07	0.09	0.07
Percentage male	0.51	0.36	0.43	0.25	0.00	0.25	0.33	0.23
Age group	0.43***	0.07	0.13*	0.06	0.16**	0.06	0.16**	0.05
Sampling quality	-0.26**	0.09	-0.02	0.07	-0.08	0.07	-0.08	0.06
Design	-0.15	0.16	-0.01	0.10	0.10	0.13	0.13	0.12
Study focus	-0.08	0.11	-0.07	0.07	-0.04	0.07	0.03	0.07
Original scale	0.18	0.16	0.11	0.09	0.06	0.12	0.04	0.12
Mean	-0.50**	0.20	0.21	0.17	-0.28	0.20	-0.43**	0.13
SD	-1.28***	0.27	0.09	0.19	-0.43	0.22	-0.21	0.22

Note. L-Part = parent-related loneliness; L-Peers = peer-related loneliness; A-Neg = aversion to being alone; A-Pos = affinity for being alone. Intercepts of the individual models are omitted from the table to save space.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Several predictors, including SD, that proved significant in the individual analyses no longer had a significant effect in the final model, because of the pattern of intercorrelations among the predictors. Results of the final models show that for adolescents, as compared to children, the estimated Cronbach's alpha is slightly lower for L-Part, L-Peers, and A-Neg and

slightly higher for A-Pos. Further, studies with a higher sampling quality have slightly higher estimates of Cronbach's alpha for L-Part. Studies that used the LACA in Dutch showed a lower estimate of Cronbach's alpha for L-Peers than studies that used the LACA in another language. Finally, results revealed that a higher mean on the subscale A-Pos was related to higher estimates of Cronbach's alpha for this scale. The final models explained 43% of the total variance for L-Part, 35% for L-Peers, 15% for A-Neg, and 13% for A-Pos.

Table 5.4

Regression Analysis Summary of the Final Models

Predictor	L-Part			L-Peers			A-Neg			A-Pos		
	B	*SE B*	$1 - e^B$	*B*	*SE B*	$1 - e^B$	*B*	*SE B*	$1 - e^B$	*B*	*SE B*	$1 - e^B$
Intercept	-2.16***	0.05	.88	-2.20***	0.04	.89	-1.65***	0.04	.81	-1.58***	0.05	.79
Age group	0.42***	0.07	.83	0.15**	0.05	.89	0.16***	0.06	.78	-0.14**	0.06	.82
Sampling quality	-0.22***	0.07	.91									
Language				0.32**	0.06	.86						
Mean										-0.34**	0.13	.85

Note. L-Part = parent-related loneliness; L-Peers = peer-related loneliness; A-Neg = aversion to being alone; A-Pos = affinity for being alone. Column $1 - e^B$ represent the predicted estimates of Cronbach's alphas.

* $p < .05$. ** $p < .01$. *** $p < .001$.

3.4 Robustness of findings

Based on Quantile-Quantile (QQ) plots, no strong indications of non-normality were encountered. We did find one outlier for the A-Neg subscale, but excluding this study did not substantially change the results (i.e., the estimated mean Cronbach's alpha changed from .802 to .800). We further performed sensitivity analyses by leaving out alphas for each study in turn and running the meta-analysis on the remaining studies. No substantial changes in results were encountered. Finally, we checked for publication bias and did not find any systematic indications for this phenomenon using multiple methods. First, visual inspection of the funnel plots revealed no problems. Second, results revealed no significant moderator effect of publication status. Third, for Kendall's Taus and Egger's intercept tests, results were mostly not significant. If a significant result was found, this only held for one of these tests. Fourth, the trim and fill method used for correcting possible biases did hardly change the results.

4. Discussion

The goal of this study was to use reliability generalization (RG) techniques to examine the internal consistency (i.e., Cronbach's alpha) of a multidimensional measure of loneliness, the Loneliness and Aloneness Scale for Children and Adolescents (LACA). The mean alpha of the four subscales was considered good. So there are now several scales, both the unidimensional UCLA-R (Vassar & Crosby, 2008) and the multidimensional LACA, that have reached the commonly accepted reliability benchmark (i.e., alpha = .80 or above), with minimal variability (i.e., SDs around .05), when averaged across a sizeable number of studies using RG techniques.

An additional objective of this study was to examine the role of a set of demographic and other variables that might affect the variability in the reliability estimates obtained, in the exploratory fashion that is typical of RG studies. In the final model, few of the potential moderators selected proved to be significant predictors of this variation in reliability, which should encourage potential users' confidence in the instrument, among academics and practitioners alike.

Just a single one of the effects obtained went in the expected direction according to classical test theory. Results for the parent-related loneliness subscale showed that samples with higher sampling quality, which can be expected to show greater variance, tended to yield slightly higher alphas. In addition, alphas for three of the four LACA subscales were somewhat lower in adolescents as compared to children. The latter finding converges with the lower reliability in adolescent samples as compared to samples of adults or the elderly for the UCLA-R in the Vassar and Crosby (2008) study. In line with these authors, we suggest that further analyses of the scales' content and their associations with external variables be conducted to further explore the appropriateness of measures of loneliness with this particular age group. The finding that samples with a higher mean score tended to have slightly higher alphas also calls for additional research. Finally, the fact that samples in which the LACA was used in its original language (i.e., Dutch) tended to have lower reliability than samples in which the instrument was used in another language may seem counterintuitive. In most cases, reduced reliability is observed when adapting a measure to another language, as linguistic subtleties tend to get lost in translation. The increased reliability observed in the present sample of studies might be explained by the overlap among the moderators used. Samples that completed a non-Dutch

version of the LACA more frequently used another version than the original one. Such versions typically are briefer and include only items with the highest factor loadings in the original version. Retaining items with high factor loadings only will automatically lead to higher Cronbach's alphas.

The present study has a number of strengths, including the large number of unpublished studies included in the analyses. However, it is important to realize that the results of RG work cannot be generalized beyond the kind of samples used in the analyses. Challenges to the generalizability of earlier reliability estimates become more demanding as the instrument under scrutiny is applied with populations and in circumstances that are more radically different from the original conditions of application. Applications with groups that can be expected to have lower alphas, such as particular clinical groups, can be particularly informative here. Yin and Fan (2000), for instance, found lower Cronbach's alpha for a measure of depressive symptoms in samples with substance abuse, presumably because substance abusers all show depressive symptoms to a certain degree. In a similar vein, future RG work with participants who are temporarily cut off from their social network (e.g., immigrant youth) or in particular types of schools that are characterized by a less supportive school climate or less beneficial conditions overall, can expand substantially on the current empirical effort. Future work also has to determine in RG analyses whether other multidimensional measures of loneliness, such as the DLS and the SELSA, yield adequate reliability estimates with limited variability over studies.

Pending such future work, the present study is a small but important step in the ongoing evaluation of the reliability of measures of loneliness, which has to be expanded upon in meta-analyses that use a larger set of studies. Generally speaking, the results seem to support the use of the multidimensional LACA in children and adolescents sampled from the general population, much like earlier work supported the use of the unidimensional UCLA Loneliness scale with adults from the general population.

6

Measurement Invariance

Across Gender and Age Groups

Maes, M., Klimstra, T., Van den Noortgate, W., & Goossens, L. (2015). Factor structure and measurement invariance of a multidimensional loneliness scale: Comparisons across gender and age. *Journal of Child and Family Studies, 24*, 1829-1837. doi:10.1007/s10826-014-9986-4

Abstract

This study focuses on the factor structure of a multidimensional loneliness measure, that is, the Loneliness and Aloneness Scale for Children and Adolescents (LACA). Confirmatory Factor Analyses (CFAs) were conducted on a large sample of children and adolescents (N = 9,676) in Belgium. Results indicated that the supposed four-factor structure of the instrument showed a superior fit when compared to alternative, more parsimonious models. Measurement invariance was established across gender and across all age groups in the intended age range (i.e., elementary school to freshman year in college). Age comparisons indicated that parent-related loneliness and positive attitudes to aloneness increased throughout adolescence. In sum, the present study offers strong support based on strict tests for the factor structure of a particular multidimensional loneliness measure (LACA). Future research should extend such analyses to other multidimensional measures of loneliness.

1. Introduction

Loneliness is the unpleasant feeling that occurs when people perceive their network of social relations to be deficient in a quantitative or qualitative way (Perlman & Peplau, 1981). It is a universal phenomenon that is experienced by everyone at some point in life. Transient feelings of loneliness may represent normative experiences, but more persistent feelings of loneliness do not. Research on children and adolescents has found relations between loneliness and several psychosocial, mental health, and physical problems, such as peer rejection, delinquency, alcohol abuse, sleep disturbances, low self-esteem, anxiety, depression, and suicidal ideation (Heinrich & Gullone, 2006).

1.1 Two approaches to measuring loneliness

In research on loneliness, two conceptual approaches have been adopted (Russell, 1982). Researchers adhering to the *unidimensional* approach conceptualize loneliness as a unitary phenomenon and focus on commonalities in loneliness experiences across contexts. The UCLA Loneliness Scale (Russell, Peplau, & Cutrona, 1980) is a well-known example of a measure inspired by the unidimensional approach. In contrast, researchers adhering to the *multidimensional* approach do not believe that loneliness can be captured by a single global measure and attempt to differentiate among various hypothesized manifestations of loneliness. Within the latter approach, one line of research aims to differentiate loneliness experiences in different relationships, such as family and peer relationships. People may feel very satisfied with their relationship with their parents, but they may at the same time feel very lonely in their contacts with their friends. The Loneliness and Aloneness Scale for Children and Adolescents (LACA; Marcoen, Goossens, & Caes, 1987) is among the most commonly used measures inspired by the multidimensional approach.

The LACA distinguishes between two relation-specific types of loneliness, that is, loneliness in relation to parents and peers, and between two types of attitudes toward aloneness, that is, negative and positive attitudes. A person's attitude toward aloneness refers to one's general reaction toward social isolation. Including a person's attitude toward aloneness increases our understanding of that person's reported level of loneliness (Goossens et al., 2009; Marcoen & Goossens, 1993). For example, individuals who score relatively high on aversion to aloneness may more easily feel lonely when being alone.

1.2 Growing evidence for the multidimensionality of adolescent loneliness

Even though the unidimensional UCLA Loneliness Scale (Russell et al., 1980) is still the most commonly used loneliness measure, evidence for a multidimensional conceptualization of loneliness is accumulating. Such evidence can be gathered at both the scale level and item level.

At the scale level, two types of evidence can be distinguished, First, exploratory factor analysis (EFA) indicated that scales from different loneliness measures loaded on multiple factors rather than a single one (Cramer & Barry, 1999; Goossens & Beyers, 2002). Confirmatory factor analysis (CFA) on a set of loneliness scales found a superior fit for a four-factor model as compared to one-, two-, and three-factor models (Goossens et al., 2009). Second, within a given multidimensional measure, research has found that the different relation-specific types of loneliness are differentially related to adolescents' well-being. For example, peer-, but not family-related loneliness was related with social phobia, whereas family-, but not peer-related loneliness was related to deliberate self-harm and eating disorders (Lasgaard, Goossens, Bramsen, Trillingsgaard, & Elklit, 2011). In a similar vein, peer attachment and social skills were more strongly associated with social loneliness (which is similar to peer-related loneliness), whereas parent attachment and relationship quality with parents were more strongly associated with family-related loneliness (DiTommaso, Brannen, & Best, 2004).

At the item level, EFA revealed the proposed four-factor structure for the LACA (i.e., parent-related loneliness, peer-related loneliness, aversion to aloneness, and affinity for aloneness; Marcoen et al., 1987). Similar evidence based on CFA was found in a study on the Italian version of the LACA (Melotti, Corsano, Majorano, & Scarpuzzi, 2006). However, these studies did not test the four-factor model against alternative, simpler models. CFA on a similar instrument, the Perth Adolescent Loneness Scale (PALS), did show a superior fit of a four-factor model (i.e., isolation, lack of friendship, aversion to aloneness, and affinity with aloneness) as compared to alternative, simpler models (Houghton et al., 2013).

1.3 Gender and age differences

A particular strength of multidimensional measures is that they could provide a more differentiated view on loneliness than unidimensional scales do. For instance, gender differences may take on a different form depending on the specific type of loneliness that is examined. Contradictory predictions concerning these differences can be found in the literature.

Regarding parent-related loneliness, it could be argued that girls live in a more protected family environment, which leads them to perceive a higher family support and experience lower parent-related loneliness (Musetti, Corsano, Majorano, & Mancini, 2012). However, it could then also be argued that girls have higher expectations than boys regarding their relationships with their parents, making them more vulnerable to experiences of loneliness when these expectations are not met. Regarding peer-related loneliness, it could be argued that girls invest more in and expect more from their peers than boys, leading them to experience more peer-related loneliness (Musetti et al., 2012). However, it could also be argued that higher investment in peers leads girls to perceive higher peer support, which results in lower peer-related loneliness. In sum, theoretical notions about gender differences in loneliness are inconclusive and clear explanations about why the difference between desired and actual levels of relationships (i.e., loneliness) is different between boys and girls are still missing.

Empirical evidence on gender differences in parent- and peer-related loneliness also points into different directions with studies finding no gender differences (Bossaert, Colpin, Pijl, & Petry, 2012; Corsano, Majorano, & Champretavy, 2006), higher scores for girls (Corsano et al., 2006; Melotti et al., 2006), and higher scores for boys (Scharf, Wiseman, & Farah, 2011; Musetti et al., 2012). Research on gender differences in attitudes toward aloneness is less common, but results seem to be inconsistent as well (e.g., Corsano et al., 2006; Houghton et al., 2013; Scharf et al., 2011).

Age differences could also take on a different form for the various types of loneliness. From early adolescence onwards, greater interpersonal distance is observed toward parents, while at the same time closer and more intimate bonds are formed with peers (Houghton et al., 2013). These opposing trends might lead to increases in parent-related loneliness and decreases in peer-related loneliness, respectively. Some cross-sectional studies with elementary and high school students confirmed these hypotheses, as they effectively found an increase in parent-related loneliness, accompanied by a decrease in peer-related loneliness from early adolescence onward (Marcoen & Goossens, 1993; Marcoen et al., 1987). Longitudinal work, which is still scarce, corroborated the observed trend for peer-related loneliness (e.g., Van Roekel, Scholte, Verhagen, Goossens, & Engels, 2010). Attitudes toward being alone also change throughout adolescence. Whereas children rarely wish to spend time alone, solitude tends to emerge as a constructive experience in adolescence (Larson, 1997). Being alone becomes less negative and is even valued by adolescents, perhaps because it provides them opportunities for self-reflection,

emotional self-renewal, and identity work (Goossens & Marcoen, 1999). Findings from cross-sectional research are in line with this proposition, as they show an increase in positive attitudes toward aloneness throughout adolescence, accompanied by a decrease in negative attitudes (Marcoen & Goossens, 1993; Marcoen et al., 1987).

1.4 Measurement equivalence across gender and age

Before researchers engage in gender and age comparisons, however, they have to substantiate that the items, as well as the underlying factors, of the measure included are interpreted in the same way by the gender and age groups. Several requirements have to be met (Chen, 2007; Van de Schoot, Lugtig, & Hox, 2012). First, researchers should examine whether the constructs are conceptualized in the same way (i.e., whether the number of factors and the pattern of factor loadings is roughly equivalent across groups; a condition called *configural invariance*). Second, to meaningfully compare associations between variables across groups, researchers should examine whether for all groups of respondents the same meaning can be attributed to the latent construct under investigation (i.e., whether the factor loadings are equal across groups; *metric invariance*). Third, to meaningfully compare means, researchers should examine whether across groups, the constant (intercept) and weights (factor loadings) are equal when items are written as a linear combination of the latent factors (i.e., *scalar invariance*). Unfortunately, these requirements have not yet been tested for the LACA or other multidimensional measures that aim to assess loneliness in different relationships.

1.5 The present study

The present study addressed various gaps in the extant literature on the LACA and, therefore, had three main objectives. First, we examined the multidimensionality of the LACA by testing the presumed factor structure against alternative, more parsimonious models. We expected the proposed four-factor model to show a superior fit to other, simpler models. Second, we checked whether comparisons across gender and age could be validly interpreted by examining measurement invariance across gender and the intended age range (i.e., students from elementary school, junior high school, senior high school, and college). Third, if the presumed factor structure was confirmed and measurement invariance was established, we proceeded to compare the gender and age groups on peer- and parent-related loneliness and negative and positive attitudes toward aloneness. As theoretical foundations were scarce and earlier results were largely inconsistent, we did not have strong expectations regarding gender

differences in loneliness. Regarding age differences, we expected an increase in parent-related loneliness and positive attitudes toward aloneness, and a decrease in peer-related loneliness and negative attitudes toward aloneness.

2. Method

2.1 Participants

Analyses were based on the combined norm groups of the loneliness instrument, that is, 29 independent samples of children and adolescents, for a total of N = 9,676 participants. Data were collected between 1993 and 2006 in all five provinces of the Dutch-speaking part of Belgium. In preliminary analyses, cohort effects were examined and found to be unsystematic and small (i.e., Cohen's d < .20; Goossens, 2016). As regards gender, there were 5,332 girls (55%) and 4,344 boys (45%). Regarding age, there were 14 samples from the upper grades in elementary school (i.e., Grades 5 and 6; N = 4,014), 2 samples from junior high school (i.e., Grades 7 through 9; N = 1,298), 10 samples from senior high school (i.e., Grades 10 through 12, N = 3,256), and 3 samples of college students (i.e., from the freshman year in the psychology program; N = 1,108). The sample was geographically diverse, as all five provinces of the Dutch-speaking part of Belgium were well-represented. All of the high school students were in the academic track, which tend to attract mainly students from Caucasian middle class families.

Gender and age were significantly related, $\chi^2(3) = 273.80$, $p < .001$, with fewer girls than expected by chance in the two youngest age groups and more girls in the two oldest age groups. Only 0.25% of the data was missing. Little's MCAR Test (Little, 1988) revealed a normed χ^2 of 1.27, which according to guidelines by Bollen (1989) indicates that the data were missing completely at random. Therefore, we imputed missing values by means of the Expectation-Maximization procedure in SPSS 22.0.

2.2 Procedure

Information letters were sent to the schools, after which the principals of the schools were contacted. The LACA was administered to all participants in class during regular school hours. A research assistant was present to introduce the study and to answer questions. This assistant emphasized that participation was anonymous and voluntary. The adolescents were informed that they could discontinue their participation in the study at any time, but none of them opted to do so.

2.3 Measure

The LACA (Marcoen et al., 1987) is a 48-item measure that comprises four subscales of 12 items each. These subscales tap into (a) parent-related loneliness (e.g., "I feel left out by my parents"), (b) peer-related loneliness (e.g., "I think I have fewer friends than others"), (c) aversion to being alone (e.g., "When I am alone, I feel bad"), and (d) affinity for being alone (e.g., "I want to be alone"). Each item can be answered on a 4-point scale ranging from (1) *never* to (4) *often*. The measure was originally developed for use with Dutch-speaking children and adolescents and was subsequently translated into English following the procedures outlined by the International Test Commission (Hambleton, 1994). This translated version has been used with English-speaking children in Great-Britain (Qualter, Brown, Munn, & Rotenberg, 2010), Ireland (De Roiste, 2000), Canada (McNamara, Willoughby, & Chalmers, 2005; Terrell-Deutsch, 1999), and the United States (Hartmann, 1991).

2.4 Plan of analysis

First, we examined whether the four-factor model would be empirically supported and would provide a superior fit to alternative, simpler models. To examine the dimensionality of the LACA, we started with the simplest model comprising just a single factor. Next, we tested whether we could distinguish between loneliness and attitudes toward aloneness by examining a two-factor model. We then tested two models to examine whether we could distinguish between parent- and peer-related loneliness, on the one hand, and between positive and negative attitudes toward aloneness, on the other hand. Finally, we tested the proposed four-factor model comprising parent- and peer-related loneliness, and positive and negative attitudes toward aloneness. The different models are described in greater detail in the Results section. We ran several Confirmatory Factor Analyses (CFAs) in Mplus 6.0 (Muthén & Muthén, 2007), using Maximum Likelihood Robust (MLR) estimation as MLR has been shown to be the most accurate estimator when the distribution of scores only slightly deviates from a normal distribution (Satorra & Bentler, 1994), which happened to be the case with the scores on the subscales.

Second, we examined configural, metric, and scalar invariance. To test for configural invariance, we examined whether the best fitting latent structure of the previous step yielded an adequate fit in the two gender and four age groups. Next, we tested for metric invariance by comparing the fit of a multigroup CFA model without constraints (cf. configural invariance) to

a multigroup CFA model in which the factor loadings were constrained to be equal across groups. We tested invariance for the two gender groups and for the four age groups. In addition, because gender and age were related, we tested for invariance of gender separately in the four age groups and for invariance of age separately in the two gender groups. Finally, we tested scalar invariance by comparing the fit of a multigroup CFA model with only the factor loadings constrained to be equal across group (cf. metric invariance) to a multigroup CFA model in which both factor loadings and item intercepts were constrained to be equal across groups.

To evaluate model fit, the use of multiple criteria has been advocated by Vandenberg and Lance (2000), as different criteria can provide information on different sources of model misspecification. Because the χ^2-statistic is well known to be overly sensitive to sample size and model complexity (e.g., Cheung & Rensvold, 2002), we relied on three other commonly used fit indices (Chen, Chyun, Li, & McCorkle, 2007), that is, the Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Squared Residual (SRMR). In addition, for the fit comparisons of the alternative models, we relied on the Bayesian Information Criterion (BIC) and the Akaike Information Criterion (AIC). The chi-square value should be as low as possible and preferably non-significant. As regards CFI, .90 represents acceptable fit and .95 good fit. RMSEA should not exceed .06 in well-fitting models and SRMR should not be larger than .08 in such models (Hu & Bentler, 1999). BIC and AIC should be as low as possible. Following the guidelines of Chen (2007), we regarded metric invariance as established if the difference in CFI (ΔCFI) between models with group-specific or common factor loadings was smaller than .010, ΔRMSEA was smaller than .015 and ΔSRMR was smaller than .030. We regarded scalar invariance as established if ΔCFI, ΔRMSEA and ΔSRMR between models with group-specific or common intercepts was smaller than .010, .015 and .010 respectively.

For CFAs, using individual items as indicators of latent factors can lead to overly complex models with a large number of parameters to be estimated. In addition, it has been argued that the optimal number of indicators for latent factors is three as it leads to a just-identified model, whereas fewer indicators lead to an under-identified model and more indicators would yield an over-identified model (Little, Cunningham, Shahar, & Widaman, 2002). It has, therefore, been recommended to use parcels consisting of multiple items instead of using individual items (e.g., Marsh & Hau, 1999) to arrive at the optimal number of three indicators per latent factor. We used the well-established item-to-construct balance parceling

method (Little et al., 2002) to create three four-item parcels for each LACA subscale resulting in a total of 12 parcels.

Finally, if both the proposed LACA factor structure and measurement invariance were established, a 2 (gender) x 4 (age) multivariate analysis of variance (MANOVA) was conducted to compare the gender and age groups on parent- and peer-related loneliness and negative and positive attitudes toward aloneness.

3. Results

In support of the supposed four-factor structure, low correlations were found among the four subscales of the LACA (Median r = .16). Moreover, high levels of internal consistency were obtained (Table 6.1).

Table 6.1

Descriptive Statistics, Intercorrelations, and Internal Consistency (Cronbach's Alpha) for the Four Subscales

Subscale	*M*	*SD*	2	3	4	Alpha
1. Parent-related loneliness	19.36	6.27	.18	.04	.17	.89
2. Peer-related loneliness	22.25	6.99	_	.15	.32	.88
3. Aversion to being alone	32.17	5.91		_	-.05	.79
4. Affinity with being alone	31.86	6.08			_	.83

Note. N = 9,676. All correlations were significant (p < .001).

3.1 Comparing alternative models

In the first step, we tested five models of which the first was an unlikely model in which all 12 parcels define a common factor. The second was a two-factor model in which the 6 parcels for the parent- and peer-related loneliness subscales define a loneliness factor and the 6 parcels for the aversion to being alone and affinity for being alone subscales define an attitude toward aloneness factor. The third model comprises a loneliness factor (6 parcels), an aversion to being alone factor (3 parcels), and an affinity for being alone factor (3 parcels). The fourth model comprises an attitude toward aloneness factor (6 parcels), a parent-related loneliness factor (3 parcels), and a peer-related loneliness factor (3 parcels). The fifth model, finally, defines each of the LACA subscales as separate factors (indicated by 3 parcels each). Fit indices for the various models are presented in Table 6.2. As expected, the chi-square values for all the

models in this table are very high because of the large sample size (N = 9,676) and the complexity of the models involved. Model 5 (i.e., the four-factor model) was the only model that provided good fit in terms of the remaining indices, that is, CFI, RMSEA, and SRMR. Furthermore, as compared to the other models, BIC and AIC were lowest for Model 5. The four-factor model was therefore selected as the best fitting model.

3.2 Measurement invariance across gender and age

In the next step, we checked whether the factor structure of the optimal fitting model (i.e., the four-factor model) held for boys and girls and across the age groups (i.e., upper elementary school, junior high, senior high, and college). Model fit was good for each gender and age group (Table 6.3), so configural invariance was established. Metric and scalar invariance were tested separately for gender and age by running multigroup CFA. Fit statistics were good for all tested models (Table 6.4). For gender, results revealed both metric (ΔCFI < .001, ΔRMSEA = .001, and ΔSRMR < .001) and scalar invariance (ΔCFI = .001, ΔRMSEA < .001, and ΔSRMR = .001). For age, results also revealed both metric (ΔCFI = .002, ΔRMSEA = .001, and ΔSRMR = .004) and scalar invariance (ΔCFI = .013, but ΔRMSEA = .008, and ΔSRMR = .004). Because of the dependency of gender and age in our sample, we further examined measurement invariance across gender in each age group separately, and measurement invariance across age in each gender group separately. For each of these models, results revealed both metric and scalar invariance (Table 6.4).

3.3 Gender and age differences

Because scalar invariance was established, we proceeded to examine gender and age differences on the four subscales of the LACA. The MANOVA showed significant gender differences on these subscales ($F(4, 9665) = 25.90$, $p < .001$, $\eta^2_p = .01$). Subsequent univariate ANOVAs revealed significant gender differences for parent-related loneliness and negative attitudes toward aloneness (Table 6.5). On average, boys scored higher than girls on parent-related loneliness, whereas girls scored higher on negative attitudes toward being alone. Effect sizes, however, were very small (η^2_ps in Table 6.5). No significant gender differences were found for peer-related loneliness and positive attitudes toward aloneness.

Table 6.2

Fit Indices for Various Factor Models

Model	Number of factors	Description	χ^2	*df*	CFI	RMSEA	SRMR	BIC	AIC
1	1	No distinctive subscales	34,722.28	54	.31	.26	.19	190481.73	190223.35
2	2	Parent + peer / negative + positive	28,682.36	53	.52	.22	.18	179316.39	179050.82
3	3	Parent + peer / negative / positive	15,319.11	51	.70	.18	.15	170059.24	169779.32
4	3	Parent / peer / negative + positive	10,078.55	51	.80	.14	.12	164287.38	164007.46
5	4	Four distinctive subscales	1,173.86	48	.98	.05	.04	154692.16	154390.71

Note. CFI = Comparative fit index; RMSEA = Root mean square error of approximation; SRMR = Standardized Root Mean Squared Residual; parent = parent-related loneliness; peer = peer-related loneliness; negative = aversion to being alone; positive = affinity for being alone. All chi-squares were significant ($p < .001$).

Table 6.3

Configural Invariance Across Gender and Age Groups

Model	*N*	χ^2	*df*	CFI	RMSEA	SRMR
Gender						
Girls	5,332	612.32	48	.98	.05	.03
Boys	4,344	614.43	48	.97	.05	.04
Age						
Elementary school	3,952	350.21	48	.98	.04	.03
Junior high school	1,413	232.51	48	.98	.05	.04
Senior high school	3,203	564.55	48	.97	.06	.04
College students	1,108	261.22	48	.97	.06	.04
Gender by Age						
Elementary school girls	2,019	214.48	48	.98	.04	.03
Junior high school girls	612	115.50	48	.98	.05	.04
Senior high school girls	1,888	287.22	48	.98	.05	.04
College students girls	813	186.08	48	.98	.06	.04
Elementary school boys	1,933	182.24	48	.98	.04	.03
Junior high school boys	801	166.19	48	.97	.06	.04
Senior high school boys	1,315	316.74	48	.96	.07	.05
College students boys	295	112.18	48	.97	.07	.05

Note. All chi-squares were significant ($p < .001$); CFI = Comparative fit index; RMSEA = Root mean square error of approximation. SRMR = Standardized Root Mean Squared Residual.

Table 6.4

Metric and Scalar Invariance Across Gender and Age Groups

Model	χ^2	*df*	CFI	RMSEA	SRMR
Gender					
Unconstrained	1,226.74	96	0.98	0.05	0.04
Metric Invariance	1,242.51	104	0.98	0.05	0.04
Scalar Invariance	1,336.80	112	0.98	0.05	0.04
Age					
Unconstrained	1,406.86	192	0.98	0.05	0.04
Metric Invariance	1,502.60	216	0.97	0.05	0.04
Scalar Invariance	2,182.88	240	0.96	0.06	0.05
Gender invariance elementary school					
Unconstrained	396.70	96	0.98	0.04	0.03
Metric Invariance	412.24	104	0.98	0.04	0.03
Scalar Invariance	451.37	112	0.98	0.04	0.03
Gender invariance junior high school					
Unconstrained	280.90	96	0.98	0.05	0.04
Metric Invariance	288.07	104	0.98	0.05	0.04
Scalar Invariance	319.04	112	0.98	0.05	0.05
Gender invariance senior high school					
Unconstrained	604.23	96	0.97	0.06	0.04
Metric Invariance	630.53	104	0.97	0.06	0.05
Scalar Invariance	683.85	112	0.97	0.06	0.05
Gender invariance college students					
Unconstrained	299.51	96	0.97	0.06	0.05
Metric Invariance	306.20	104	0.97	0.06	0.05
Scalar Invariance	343.28	112	0.97	0.06	0.05
Age invariance girls					
Unconstrained	800.46	192	0.98	0.05	0.04
Metric Invariance	847.74	216	0.98	0.05	0.04
Scalar Invariance	1,278.11	240	0.96	0.06	0.04
Age invariance boys					
Unconstrained	780.61	192	0.97	0.05	0.04
Metric Invariance	866.45	216	0.97	0.05	0.05
Scalar Invariance	1,186.64	240	0.96	0.06	0.05

Note. All chi-squares were significant ($p < .001$); CFI = Comparative fit index; RMSEA = Root mean square error of approximation. SRMR = Standardized Root Mean Squared Residual.

Table 6.5

Univariate ANOVAs and Post-hoc Group Comparisons Based on Tukey HSD Tests

	Girls	Boys			Elementary	Junior high	Senior high	College		
Subscale	*Mean (SD)*	*Mean (SD)*	F^1	η^2_p	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*	F^2	η^2_p
Parent	19.29 (6.34)	19.44 (6.18)	22.22***	.00	17.52^{a} (4.77)	19.02^{b} (6.57)	21.32^{d} (6.75)	20.70^{c} (7.07)	271.03***	.08
Peer	22.45 (7.08)	22.00 (6.88)	2.98	.00	22.97^{c} (7.08)	20.74^{a} (7.35)	21.58^{b} (6.69)	23.51^{c} (6.54)	53.72***	.02
Negative	32.59 (5.81)	31.65 (6.00)	74.57***	.01	32.20^{b} (5.90)	31.54^{a} (5.99)	$31.96^{a,b}$ (5.89)	32.17^{c} (5.91)	8.48***	.00
Positive	32.18 (6.02)	31.47 (6.12)	0.23	.00	30.92^{b} (5.92)	29.69^{a} (6.45)	32.84^{c} (5.73)	35.15^{d} (5.19)	222.94***	.07

Note. Parent = parent-related loneliness; peer = peer-related loneliness; negative = aversion to being alone; positive = affinity for being alone. For age, means are significantly different from one another if they have different superscripts.

[1]*df* = 1, 9668. [2]*df* = 3, 9668.

*** $p < .001$.

Regarding age, the MANOVA showed significant group differences on the LACA ($F(12, 25571.48) = 142.07$, $p < .001$, $\eta^2_p = .06$). Subsequent univariate ANOVAs revealed significant age differences for all four subscales. Post-hoc comparisons based on Tukey HSD Tests revealed an increase in scores for parent-related loneliness from elementary to junior high school and further from junior high school to senior high school. A drop in parent-related loneliness was found for college students compared to senior high school students. For peer-related loneliness, after a decrease in junior high school, scores increased for senior high school and college students. Scores on negative and positive attitudes toward aloneness followed this same pattern (i.e., an initial decrease followed by an increase). Effect sizes were again relatively small, especially regarding peer-related loneliness and negative attitudes toward aloneness.

Finally, the MANOVA showed a significant interaction effect between gender and age ($F(12, 25571.48) = 9.04$, $p < .001$, $\eta^2_p = .00$). The interaction effect sizes of the MANOVA and subsequent ANOVAs were very small (i.e., all $\eta^2_p < .01$). We therefore believe that, although interaction effects were significant due to the large sample size, they have no practical relevance. Hence, we will not present gender comparisons within each age group separately.

4. Discussion

The present study confirmed the proposed multidimensional structure of the Loneliness and Aloneness Scale for Children and Adolescents (LACA) and established measurement invariance across gender and age groups. Moreover, gender and age group differences, although small, were found regarding parent- and peer-related loneliness and negative and positive attitudes toward aloneness.

Confirmatory factor analyses revealed that the four-factor model that guided the construction of the LACA fitted the data well and showed superior fit to alternative, more parsimonious models. Moreover, intercorrelations among the four subscales were low and internal consistency was high for all subscales. Using (multigroup) confirmatory factor analyses, we further established configural, metric, and scalar invariance across the gender and age groups. These findings imply that the items, as well as the underlying latent factors, are interpreted similarly by boys and girls and by all participants in the intended age range, that is, from elementary school students to college students. LACA scores can thus be meaningfully compared, not only across gender, but also across this large age range.

Results indicated gender and age differences on the LACA subscales. Regarding gender differences, we found that boys scored higher on parent-related loneliness, which confirms an earlier finding for family-related loneliness (Schmitt & Kurdek, 1985). Girls scored higher than boys on aversion to aloneness, a finding reported only occasionally in the literature (Marcoen & Goossens, 1993). Because the difference we have found is rather small, it might be that previous studies have not detected it due to low statistical power. Finally, we found no significant gender differences for peer-related loneliness and affinity for aloneness which differs from other studies that found higher peer-related loneliness in boys or girls and higher affinity for alones for girls (Corsano et al., 2006; Houghton et al., 2013; Scharf et al., 2011).

However, all effects sizes were small and the differences between boys and girls were less than 1 point on a 48-point scale in our large sample. These very small effect sizes and the inconsistency of results in previous studies could imply that, on average, there are no or only minimal gender differences in loneliness and attitudes toward aloneness. The differences that have been found may be due to random variation or to specific samples or conditions in which gender differences are more prominent. To arrive at a definitive conclusion regarding gender differences in loneliness, a meta-analysis across the available literature is clearly needed.

Regarding age differences, the results for two of the subscales are in line with prior cross-sectional research in elementary and high school students (Marcoen & Goossens, 1993; Marcoen et al., 1987). Parent-related loneliness seems to increase from early adolescence onward. In addition, we found that loneliness in relation to parents was slightly lower for college students as compared to senior high school students. This is in line with prior research that found lower levels of perceived parental conflict in college students than in high school students (Furman & Buhrmester, 1992). College students tend to live away from home, which might lead to lower perceptions of conflict and in turn to less feelings of parent-related loneliness. Positive attitudes toward aloneness tend to drop after elementary school and to increase thereafter. This trend is in line with research showing that it is only during adolescence that positive attitudes toward aloneness emerge and that time alone is used deliberately, for example, for identity formation (Larson, 1997).

For the other two subscales, the observed trends were not clearly in line with earlier findings, that is, a decrease in peer-related loneliness and negative attitudes toward aloneness until senior high school. For peer-related loneliness, scores tend to drop after elementary school

and then increase again for the senior high school and college students. The same pattern was found for negative attitudes toward aloneness. However, the effect sizes and actual group differences are rather small for both peer-related loneliness and negative attitudes toward aloneness.

Several limitations of the present study need to be mentioned and provide suggestion for further research. First, the study was conducted with children and adolescents from the Dutch-speaking part of Belgium, with a majority of participants representing Caucasian middle class families. Caution is therefore warranted when generalizing our findings to children and adolescents with different cultural and socio-economic backgrounds. Second, longitudinal studies are needed to confirm and extend the present findings. Our results suggest certain age trends, but cross-sectional designs are less suited to infer developmental trends. Third, the present study established measurement invariance across age and gender groups for a specific instrument that focuses on relation-specific types of loneliness. However, other such instruments have been developed as well (e.g., the Social and Emotional Loneliness Scale for Adults, SELSA; DiTommaso & Spinner, 1993), for which measurement invariance still needs to be established.

Pending further research, the present study is an important contribution to the literature on psychometric characteristics of multidimensional loneliness measures. Confirmatory factor analysis indicates that the LACA is an excellent option for researchers who wish to examine relation-specific types of loneliness and attitudes toward aloneness across childhood and adolescence. So far, the LACA is the only multidimensional loneliness measure for which it is established that one can legitimately compare gender and age groups on both associations with external variables and mean scores. As the age range examined is considerable, the age differences obtained both confirm and expand upon earlier studies. In line with earlier research, parent-related loneliness increased throughout adolescence, but decreased somewhat in college. Positive attitudes to being alone also increased throughout adolescence and this trend extended into college. Gender differences in loneliness and attitudes to aloneness, however, still await further clarification.

7

Measurement Invariance Across Cultural Groups

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Abstract

Loneliness is an adverse phenomenon that tends to peak during adolescence. As loneliness is a subjective state, it is different from the objective state of being alone. People's attitudes toward being alone can be more or less negative or positive. Cultures differ in the form and meaning of social behavior, interpersonal relationships, and time spent alone. However, for cross-cultural comparisons to be meaningful, measurement invariance of the measure should be established. The present study examined measurement invariance of the Loneliness and Aloneness Scale for Children and Adolescents (LACA) in a sample of 218 Belgian and 190 Chinese early adolescents, aged 11 to 15 years. Using nested multigroup confirmatory factor analyses, measurement invariance of the LACA across Belgium and China was established. More specifically, evidence was found for configural, metric, and partial scalar invariance. Because partial scalar invariance was established, the two cultural groups could be compared. No significant differences were found for peer-related loneliness. Regarding the attitudes toward aloneness, Belgian adolescents were more negative and less positive toward being alone than Chinese adolescents. The present study is encouraging for researchers who want to use the LACA for cross-cultural comparisons, in that we found evidence for measurement invariance across two disparate cultural groups speaking completely different languages.

1. Introduction

Loneliness is an unpleasant, subjective experience that occurs when people perceive their social relations to be deficient in some important way, either quantitatively or qualitatively (Perlman & Peplau, 1981). It is a universal phenomenon that is experienced by all human beings at some time in life, but tends to peak during adolescence (Qualter et al., 2015). Transient feelings of loneliness may represent normative experiences, but persistent feelings of loneliness may have detrimental effects on one's mental and physical well-being across development (Ernst & Cacioppo, 1999; Heinrich & Gullone, 2006). One can feel lonely when alone, but also when surrounded by other people. Hence, loneliness is different from being alone, which is an objective experience. People differ in their general reaction toward being alone, that is, their attitude toward aloneness, which may be more or less negative or positive. There might be cultural differences in adolescents' loneliness and negative and positive attitudes toward aloneness. However, before cross-cultural comparisons can be made, measurement invariance should be established.

Cultures differ in the form and meaning of social behaviors, and ascribe different values and meaning to interpersonal relationships (Chen & French, 2008; Van Staden & Coetzee, 2010). Cultures are often classified as varying in levels of individualism and collectivism. However, it is not clear which of these types of cultures has a higher prevalence rate of loneliness. Chen et al. (2004) and Lykes and Kemmelmeier (2014) both described two contrasting hypotheses. The first hypothesis stated that in more individualistic cultures, psychological autonomy and individuality are highly valued, which may lead to feelings of social alienation and loneliness among early adolescents. More collectivistic cultures are more group-oriented and provide more social support, which may lead to feelings of belongingness and interpersonal connectedness. The second hypotheses, by contrast, stated that in these collectivistic cultures, the thresholds for loneliness may be relatively low. Expectations for social connections may be higher and therefore more difficult to meet, which results in feelings of loneliness. In a similar vein, in individualistic cultures, the threshold for loneliness may be relatively high. The expectations for social connections may be lower and therefore easier to meet. These theoretical notions, however, are about the importance of social connections in a particular culture, whereas loneliness is about the negative feeling that arises when there is a *gap* between the actual and desired social connections. Cross-cultural theories about this gap between actual and desired social connections, that is, loneliness, have not been developed yet.

Empirical evidence on cross-cultural differences in loneliness in adolescents is scarce. When comparing adolescents from two more individualistic cultures, that is, Western Australia and the US, no significant differences in loneliness were found (Renshaw & Brown, 1992). When comparing adolescents from two more collectivistic cultures, that is, Cape Verde and Portugal, no significant differences were found either (Neto & Barros, 2000). When comparing more individualistic with more collectivistic cultures, finally, no significant differences in levels of loneliness were found for adolescents from Canada, Southern Italy, Brazil, and China (Chen et al., 2004), Russia and the US (Stickley, Koyanagi, Koposov, Schwab-Stone, & Ruchkin, 2014), or Canada and China (Liu et al., 2015).

Cultures also differ in the value they place on time spent alone (Jones, Carpenter, & Quintana, 1985; Larson, 1990). However, empirical evidence on cross-cultural differences in attitudes toward being alone in adolescence is almost non-existent. Some theoretical notions do appear in the literature. Regarding China and Western countries, two lines of reasoning can be found in the literature. According to the first line of reasoning, being alone might be valued more positively in Western countries and more negatively in China. In Western countries, assertiveness and autonomy are valued and being alone might be seen as an autonomous expression of personal choice (Liu et al., 2015). In China, however, greater value is placed on interdependence and commitment to the group. Being alone might therefore be seen as selfish and in conflict with the group orientation (Liu et al., 2015). Based on this reasoning, we might thus expect more positive and less negative attitudes toward aloneness in Belgian than in Chinese adolescents.

According to the second line of reasoning, being alone might be more negatively viewed in Western countries and more positively in China. Most people in modern Western society see being alone as an undesirable state (Suedfeld, 1982). When alone, they actively try to find companionship or distract themselves, for example, by watching television. Also, when encountering another person who spends much time alone, they feel sorry for that person (Suedfeld, 1982). In China, attitudes toward being alone might be more positive. Several translations are available in Chinese for the English term “solitude”, all including the root term “du”, which is also the root for “independence” and “uniqueness” in Chinese (Averill & Sundararajan, 2014). Contrary to the more commonly noted Chinese emphasis on collectivism, there is a strong tradition of individualism in China. Similarly, in the West, a hermit is seen as an outsider, whereas in China this lifestyle is actually valued very positively and appears as a

common theme in Chinese poetry (Averill & Sundararajan, 2014). Based on this reasoning, we might expect more positive and less negative attitudes toward aloneness in Chinese than in Belgian adolescents.

Associations among various aspects of one's attitude toward being alone can also be examined. Positive and negative attitudes toward aloneness can be measured in early adolescence using the Loneliness and Aloneness Scale for Children and Adolescents (LACA; Marcoen, Goossens, & Caes, 1987). These attitudes were found to represent separate factors in confirmatory factor analyses on almost 10,000 Belgian children and adolescents (Maes, Klimstra, Van den Noortgate, & Goossens, 2015). Moreover, a recent meta-analysis showed a very small average correlation between the two (r = -.02; Maes, Van den Noortgate, & Goossens, 2015). However, the large majority of the studies included in that meta-analysis sampled from Western countries. It is not yet known whether a similar association between the two types of attitudes toward aloneness holds in adolescents from non-Western countries.

Peer-related loneliness can also be measured using the LACA. Associations between peer-related loneliness and attitudes toward aloneness again have been examined in Western countries mainly. Across studies, a small correlation was found between peer-related loneliness and negative attitudes toward aloneness (r = .15) and a medium correlation was found between peer-related loneliness and positive attitudes toward aloneness (r = .34; Maes, Van den Noortgate et al., 2015). However, it is not entirely clear how loneliness and attitudes toward aloneness are related (Majorano, Musetti, Brondino, & Corsano, 2015). For example, it could be the case that adolescents with positive attitudes toward aloneness create more opportunities to spend time alone and, as a consequence, may miss opportunities for social interactions leading to increased loneliness. However, it could also be the case that adolescents' dissatisfaction with their relationships with peers makes them more inclined to spend time alone (Majorano et al., 2015). Cross-cultural studies on these issues have not been conducted yet.

For cross-cultural comparisons to be meaningful, researchers should first establish measurement invariance, which basically means that the instrument is measuring the same factor structure in the cultures that are studied (Chen, 2007; Van de Schoot, Lugtig, & Hox, 2012). However, none of the studies mentioned earlier has directly addressed measurement invariance. There are several levels of measurement invariance. The first level is called *configural* invariance, and implies that items are associated with the same factors for the

cultures being compared. Analyses at this level examine whether the instrument that is used is configured to measure basically the same constructs. The second level is called *metric* invariance, and implies that the relations between specific scale items and the underlying constructs (i.e., factor loadings) are equal across cultures. Analyses at this level examine whether the latent constructs have exactly the same meaning across cultures (Van de Schoot et al., 2012). Metric invariance is important to establish when researchers aim to compare associations between variables across cultures. The third level of measurement invariance is called *scalar* invariance, and implies that not only the factor loadings, but also the levels of the underlying items (i.e., intercepts or constants when items are written as linear combinations of factors) are equal across groups. Scalar invariance should be established if researchers want to compare the means of different groups. Full scalar invariance, however, may be considered unrealistic, especially when diverse cultural groups are compared that speak completely different languages (Byrne & Watkins, 2003; Steenkamp & Baumgartner, 1998). Partial scalar invariance, with at least two items per factor exhibiting scalar invariance, has been found sufficient to conduct comparisons of means across countries (Byrne, Shavelson, & Muthen, 1989; Steenkamp & Baumgartner, 1998).

A first aim of this study was to examine measurement invariance across Belgian and Chinese early adolescents for the Loneliness and Aloneness Scale for Children and Adolescents (LACA; Marcoen et al., 1987). A second aim was to explore cross-cultural differences in loneliness and attitudes toward being alone. Regarding loneliness, previous studies on adolescents did not find significant differences across cultures. So we did not expect marked differences in loneliness. Regarding attitudes toward aloneness, two contrasting lines of reasoning appear in the literature and no empirical evidence is available as of yet. Therefore, we could not state strong a priori hypotheses about cultural differences in these attitudes, and we examined these differences in a more exploratory way. Finally, we also examined cross-cultural differences in the associations among loneliness and attitudes toward aloneness, again in an exploratory way.

2. Method

2.1 Participants

Two convenience samples were recruited for the present study. One sample came from the Dutch-speaking part of Belgium (N = 229) and the other came from Beijing, China (N =

200). The Belgian sample consisted of fewer females (53.7%) than the Chinese sample (66.5%), $\chi^2(2) = 264.98$, $p < .001$. All participants were between 11 and 15 years old, but the participants were somewhat younger in the Belgian sample (M = 12.80, SD = 0.74) as compared to the Chinese sample (M = 13.62, SD = 0.63), $t(422) = 12.14$, $p < .001$. Information about the socioeconomic background of the participants was not available, but the schools they were drawn from are known to serve primarily middle and upper middle class neighborhoods. Most Chinese adolescents (85%) came from two-parent families, but this information was not available for the Belgian adolescents.

Because measurement invariance studies rely on fitting the observed data to a model, any bias in one of the groups due to outliers will affect factor loadings, intercepts, and error variances (Van de Schoot et al., 2012). Therefore, before examining measurement invariance, we removed participants with univariate outliers. That is, values more than 3 *SD* below or above the mean (7 cases in the Belgian sample and no cases in the Chinese sample) were removed. We also removed participants with multivariate outliers, based on their Mahalanobis distance values (Tabachnick, Fidell, & Osterlind, 2001; 4 cases in the Belgian sample and 9 cases in the Chinese sample). Little's MCAR Test (Little, 1988) indicated that the data could be considered as missing at random, $\chi^2(434) = 459.04$, $p = .196$. Therefore, we imputed missing values by means of the Expectation-Maximization procedure in SPSS 22.0, except for one case from the Chinese sample that had missing values on 27 of the 36 LACA items and therefore was removed from our dataset. This multi-step approach resulted in a final analytical sample of 218 Belgian and 190 Chinese adolescents.

2.2 Procedure

For the Belgian sample, information letters were sent to the schools, after which the principals of the schools were contacted. The participants filled out the LACA during regular school hours with a research assistant being present to introduce the study and answer questions. This assistant emphasized that participation was anonymous and voluntary, and that the adolescents could discontinue their participation at any time. This procedure was in line with the ethical standards at the time of data collection. The Chinese sample was drawn from the research project "Social Withdrawal, Friendship, and Social, School, and Psychological Adjustment in Chinese Adolescents". Participants were first contacted by telephone. If both parents and adolescents expressed interest, parental consent and adolescent assent forms were

mailed to the home with preaddressed and stamped return envelopes, along with the questionnaire measurements.

2.3 Measure

Participants filled out three subscales of the Loneliness and Aloneness Scale for Children and Adolescents (LACA; Marcoen et al., 1987) in either Dutch or Chinese. These subscales, of 12 items each, measured peer-related loneliness (e.g., "I feel sad because I have no friends"), negative attitudes toward being alone (e.g., "When I am alone, I feel bad"), and positive attitudes toward being alone (e.g., "I want to be alone"). Items could be answered on a 4-point Likert-type scale ranging from (1) *often* to (4) *never*. The fourth subscale of the LACA, measuring parent-related loneliness, was not included because the focus of the broader project for which the Chinese data were collected was on peer relationships (Wang, 2014).

The LACA was translated carefully into Chinese by several members of the research team who were fluent in both English and Mandarin (Wang, 2011). The LACA was then back-translated to ensure comparability with the English version. A variety of formal and informal strategies (e.g., repeated discussion in the research group, interviews with youth, and psychometric analysis) were applied to maximize the validity of the items. Earlier research indicated that the internal consistency of the subscales was high (i.e., $\alpha > .80$) in studies from several countries (Maes, Van den Noortgate et al., 2015). In the current study, Cronbach's alphas were also good, in both the Belgian and Chinese samples, for peer-related loneliness ($\alpha = .91$ and .89, respectively), negative attitudes ($\alpha = .79$ and .87, respectively), and positive attitudes toward being alone ($\alpha = .87$ and .83, respectively). Average scores for Belgian and Chinese adolescents were similar to the values reported in previous research (Maes, Klimstra et al., 2015) on the three subscales, that is, peer-related loneliness ($M_{BE} = 21.39$, $SD_{BE} = 7.50$ and $M_{CN} = 24.05$, $SD_{CN} = 7.19$), negative attitudes toward aloneness ($M_{BE} = 32.04$, $SD_{BE} = 6.15$ and $M_{CN} = 29.92$, $SD_{CN} = 7.17$), and positive attitudes toward aloneness ($M_{BE} = 29.06$, $SD_{BE} = 7.37$ and $M_{CN} = 32.52$, $SD_{CN} = 6.53$).

2.4 Statistical analyses

All analyses were performed in Mplus 6.11 (Muthén & Muthén, 2007). To test for configural invariance, we examined whether a three-factor model (with the items of the three respective subscales loading on these three factors) yielded adequate fit in both samples separately. Configural invariance is further established by running a multiple group

confirmatory factor analysis (CFA) with no constraints. To test for metric and scalar invariance, we compared the fit of multigroup models without constraints (i.e., not assuming metric or scalar invariance) to constrained models (i.e., by constraining intercept and loadings to the same values for both groups, to explore metric and scalar invariance, respectively). As recommended by Cheung and Rensvold (2002), we relied on multiple indices when evaluating model fit, including the Normed Chi-Square, the Comparative Fit Index (CFI), the Root Means Square Error of Approximation (RMSEA), and the Standardized Root Mean squared Residual (SRMR). The Normed Chi-Square should be between 1.00 and 5.00, as values below 1.00 reflect poor model fit and values above 5.00 reflect a need for improvement (Schumacker & Lomax, 2004). As regards CFI, .90 represents acceptable fit and .95 good fit. RMSEA and SRMR should not exceed .06 and .08, respectively, to consider the models as good-fitting models and should not be larger than .08 and .10, respectively, for mediocre-fitting models (Hu & Bentler, 1999). Following the guidelines of Chen (2007), we regarded metric invariance as established if the difference in CFI (ΔCFI) between models with group-specific or common factor loadings is smaller than .010, ΔRMSEA is smaller than .015 and ΔSRMR is smaller than .030. We regarded scalar invariance as established if ΔCFI, ΔRMSEA and ΔSRMR between models with group-specific or common intercepts is smaller than .010, .015, and .010, respectively. In addition, we relied on the Akaike information criterion (AIC) and the Bayesian information criterion (BIC), which should be as low as possible.

We did not use items as indicators of latent factors, but we aggregated items into parcels. Numerous researchers have highlighted the psychometric merits of parcels relative to items, such as higher reliability and communality, and the advantages of models based on parcels regarding factor solution and model fit (Little et al., 2002). A reduction in model complexity when using parcels is expected to lead to more stable parameter estimates (Nasser-Abu Alhija & Wisenbaker, 2006). Moreover, when the data to be analyzed are nonnormally distributed and coarsely categorized, is has been found that parameter estimates are usually unbiased, but that the model fit indices are adversely affected. Using parcels reduced this effect, without leading to biased parameter estimates (Bandalos, 2002). However, these advantages of parceling only hold when the set of parceled items within a factor is unidimensional (Nasser-Abu Alhija & Wisenbaker, 2006; Bandalos, 2002). The factor structure of the LACA has been examined in previous studies (Goossens, 2016; Marcoen et al., 1987; Maes, Klimstra et al., 2015) suggesting that the items within each subscale of the LACA are unidimensional. This is confirmed by

factor analyses on the data of the current sample. For each subscale, three four-item parcels were created based on the factor loadings obtained for the total sample, following the well-established item-to-construct balance parceling method described by Little, Cunningham, Shahar, and Widaman (2002).

For our second aim, that is, to explore cross-cultural differences in loneliness and attitudes toward being alone, we used the same multi-group models. When using a multi-group model in Mplus, the means of the latent variables for one group are automatically set to zero. The values of the means of the latent factors for the other group actually represent the difference in these means between the two groups. A two-tailed test is provided showing whether these values (i.e., the mean differences) differ from zero. Finally, we examined cross-cultural differences in correlations among the LACA factors between Belgian and Chinese adolescents in exploratory fashion, using the Wald Test.

3. Results

Configural invariance was first examined by running confirmatory factor analyses with the three-factor structure that was used to construct the LACA instrument for the two samples separately. Model fit is presented in Table 7.1. RMSEA was somewhat high, but the Normed Chi-Square, CFI, and SRMR suggested an acceptable to good fit for both the Belgian and Chinese samples.

Table 7.1

Configural Invariance for the Belgian and Chinese Sample

Model	χ^2 / *df*	CFI	RMSEA	SRMR
Belgium	2.77	0.96	0.09	0.08
China	4.22	0.92	0.13	0.08

Note. χ^2 / *df* = Normed Chi-Square; CFI = Comparative fit index; RMSEA = Root mean square error of approximation; SRMR = Standardized root mean squared residual.

Table 7.2 shows the model fit indices for the unconstrained and constrained models. The unconstrained model also showed acceptable fit, which meant that the number of factors and the pattern of factor loadings were roughly equivalent in both groups and that we could establish

configural invariance. Evidence for metric invariance was also found (ΔCFI = .003, ΔRMSEA = .003, ΔSRMR = .008), which meant that factor loadings could be regarded as equal in both groups. The AIC and BIC values confirmed this finding, as AIC is only somewhat higher and BIC is even lower when comparing the constrained with the unconstrained model.

Table 7.2

Metric and Scalar Invariance Across Cultural Groups

Model	χ^2 / *df*	CFI	RMSEA	SRMR	AIC	BIC
Unconstrained	3.50	0.939	0.111	0.079	5573.05	5813.72
Metric invariance	3.36	0.936	0.108	0.087	5574.58	5791.19
Scalar invariance	5.50	0.863	0.149	0.104	5711.44	5903.98
Partial scalar invariance	3.84	0.917	0.118	0.088	5607.71	5808.27

Note. χ^2 / *df* = Normed Chi-Square; CFI = Comparative fit index; RMSEA = Root mean square error of approximation; SRMR = Standardized root mean squared residual.

Because full scalar invariance could not be established (ΔCFI = .073, ΔRMSEA = .041, ΔSRMR = .017), we tested for partial scalar invariance. Based on the modification indices, we released the constraints of the intercepts for one parcel loading on the peer-related loneliness factor and for one parcel loading on the negative attitudes toward being alone factor. With these constraints released, evidence was found for partial scalar invariance (ΔCFI = .019, but ΔRMSEA = .010, ΔSRMR = .001). The AIC and BIC values seemed to confirm this finding as they were not much larger in the partial scalar invariance model compared with the metric invariance model.

Because partial scalar invariance was established, we proceeded to compare the factor means between Belgian and Chinese early adolescents. In addition, we examined the correlations among the three factors, that is, peer-related loneliness, and negative and positive attitudes toward being alone, for the two samples separately. Because the two groups differed significantly regarding gender and age, we controlled for these variables by adding them to the model. In this analysis, age was centered around the grand mean of 13 years. The differences in factor means between the two groups and the correlations among the factors are presented in Table 7.3.

Table 7.3

Unstandardized Differences Between Factor Means and Intercorrelations Among the Factors Controlling for Gender and Age

Subscale	M_{Diff}	*SE*	1	2	3
1. Peer-related loneliness	-0.07	0.07	-	.14	.53***
2. Negative attitudes toward being alone	0.28**	0.08	.30***	-	-.26**
3. Positive attitudes toward being alone	-0.36***	0.08	.43***	-.16	-

Note. Intercorrelations for the Belgian sample are presented above the diagonal and intercorrelations for the Chinese sample are presented below the diagonal. A positive mean difference, M_{Diff}, means that the Belgian sample scores higher.

* $p < .05$. ** $p < .01$. *** $p < .001$.

No significant differences were found between the Belgian and Chinese adolescents regarding peer-related loneliness, but significant differences emerged for attitudes toward being alone. On average, Belgian adolescents scored higher on negative and lower on positive attitudes toward being alone than Chinese adolescents. Correlations among the three factors were also compared between the two groups. Results from an overall Wald Test demonstrated no significant differences, $\chi^2(3) = 5.06$, $p = .17$. Results from separate Wald tests for each pair of correlations also indicated that there were no statistically significant differences between the two groups ($p = .09$ to $.45$).

4. Discussion

In all psychological research, it is essential to establish measurement invariance when groups are compared (Byrne & Watkins, 2003). The large majority of cross-cultural studies on loneliness, however, have not explicitly addressed this issue. Some cross-cultural researchers replicated the factor structure across cultural groups (i.e., configural invariance), but such evidence is not sufficient to conduct meaningful comparisons across groups. The present study examined more demanding levels of measurement invariance for the Loneliness and Aloneness Scale for Children and Adolescents (LACA; Marcoen et al., 1987) in Belgian and Chinese early adolescents. In line with previous research in Belgium (Maes, Klimstra et al., 2015) and Italy (Cicognani, Klimstra, & Goossens, 2014), the model reflecting the proposed factor structure of

the LACA yielded a good fit for both the Belgian and Chinese sample. In addition to configural invariance, we established metric and partial scalar invariance.

In addition, because partial scalar invariance could be established (Byrne et al., 1989; Steenkamp & Baumgartner, 1998), we explored cross-cultural differences in loneliness and attitudes toward aloneness. First, the Belgian and Chinese adolescents in our study did not differ on peer-related loneliness. This result is in line with previous studies that found no significant differences in loneliness between adolescents with diverse cultural backgrounds. These studies have used other measures of loneliness, including a single-item measure and two well-known loneliness measures, that is, the Children's Loneliness Scale (Asher, Hymel, & Renshaw, 1984) and the UCLA Loneliness Scale (Russell, Peplau, & Cutrona, 1980). Despite this variety of measures, all studies show similar results, which seems to suggest that there are no differences in levels of loneliness in adolescents from different countries.

Second, we explored cross-cultural differences in attitudes toward aloneness, which has not been done before. We found that the Belgian adolescents in our sample showed greater negative and less positive attitudes toward being alone than the Chinese adolescents. This finding is in line with previous findings (Suedfeld, 1982) that indicated that in the Western world, being alone is seen as an undesirable state. Our findings are also in line with research (Averill & Sundararajan, 2014) that emphasized the Chinese traditions of eremitism (i.e., living in seclusion from social life) and individualism. However, replication of these results is needed, as this is the first study to examine attitudes toward being alone from a cross-cultural perspective. Third, we examined cross-cultural differences in associations among loneliness and attitudes toward aloneness between Belgian and Chinese adolescents and found no differences in this regard. For both groups, negative and positive attitudes toward aloneness were negatively related. In addition, peer-related loneliness was positively related with both attitudes toward aloneness in both Belgian and Chinese adolescents. However, although we found no significant differences in these associations between the two groups, the size of the associations seem to differ and additional research on these correlations is needed.

Besides the innovative aspect of this study, there are also some limitations to keep in mind. Both samples were of medium size and not nationally representative. We were only able to establish measurement invariance for Belgian adolescents from the Dutch-speaking part of the country and Chinese adolescents from Beijing. Future research should aim to replicate our

results using larger and nationally representative samples. Such samples could include, for instance, a more diverse set of participants, such as children and adolescents from other regions of Belgium and China and participants with other cultural and socioeconomic backgrounds. Furthermore, the present study examined measurement invariance only. This is an important requirement before groups can be compared, but it is not the only one. Other types of biases might exist as well (Van de Vijver & Tanzer, 2004) and future studies should address these. One such study could be a more qualitative study with open interviews to investigate whether Belgian and Chinese adolescents themselves mention similar feelings, thoughts, and behaviors when talking about loneliness and attitudes toward being alone. Finally, no data were available for the fourth subscale of the LACA, that is, parent-related loneliness, which should be included in future research.

Despite these limitations, the present study extends the current literature on loneliness in significant ways. We found evidence for measurement invariance of the Loneliness and Aloneness Scale for Children and Adolescents across two disparate cultural groups speaking completely different languages. In addition, we confirmed previous research that found no differences in loneliness in adolescents with a different cultural background. Finally, we extended the literature by examining cross-cultural differences in attitudes toward aloneness in an exploratory way. The findings regarding the latter topic, which question traditional views on solitude in collectivistic cultures, are in need of replication in future research on larger and more representative samples.

Part 3

Identifying Vulnerable Groups

Afhankelijk en eenzaam
Niet in de maatschappij
Rennen we in sneltreinvaart
Aan hem en haar voorbij.

(Marco Borsato, Oud en Afgedankt)

8

Loneliness in Children and Adolescents With Chronic Physical Conditions

Maes, M., Van den Noortgate, W., Fustolo-Gunnink, S., Rassart, J., Luyckx, K., & Goossens, L. (2016). *Loneliness in children and adolescents with chronic physical conditions: A meta-analysis*. Manuscript in preparation.

Abstract

The present meta-analysis aimed to synthesize the available evidence on levels of loneliness in children and adolescents with chronic physical conditions as compared to their peers. Multilevel meta-analyses were performed on 39 studies that comprised 63 samples and were published between 1987 and 2014. A total of 2,286 children and adolescents with chronic physical conditions and 1,330 control peers were included in the present analyses. Results showed that children and adolescents with chronic conditions are, on average, somewhat lonelier than their peers without such conditions. Moreover, results showed that this link between chronic conditions and loneliness varied according to the recruitment procedure employed for participant selection. The strongest link was found for studies that recruited children and adolescents from patient bodies and activities as compared to schools or clinical registers. Although this meta-analysis provided important insights on loneliness in children and adolescents with chronic conditions, future research should take into account the heterogeneity within patient groups. We advocate an alternative approach to this issue that cuts across diagnostic boundaries and focuses on illness-related variables such as illness duration and visibility of the condition.

1. Introduction

Loneliness is the unpleasant feeling that occurs when people perceive their social relations to be deficient in an important way, either quantitatively or qualitatively (Perlman & Peplau, 1981). Feelings of loneliness in children and adolescents have been associated with a wide range of negative outcomes, including school drop-out, depressive symptoms, social anxiety, suicide ideation, low self-esteem, eating disorders, and sleep problems (Heinrich & Gullone, 2006; Mahon, Yarcheski, Yarcheski, Cannella, & Hanks, 2006). In addition, for children and adolescents with chronic physical conditions, loneliness has been associated with disease-specific correlates, such as more cardiac symptoms (Vanhalst et al., 2013) and less illness adjustment (Curtin & Siegel, 2003). However, at present, it is not clear whether children and adolescents with chronic conditions feel lonelier than their healthy peers. The present meta-analysis aimed to synthesize the available evidence and to examine whether differences in loneliness between children and adolescents with chronic conditions and controls vary in size or direction according to sample and study characteristics, such as the type of chronic condition examined, the recruitment procedure, and the type of comparison group.

1.1 Loneliness in children and adolescents with chronic physical conditions

The prevalence of chronic physical conditions in children and adolescents has increased since the 1980s, with estimates ranging from 0.22% to 44%, depending on the operationalization used (Van der Lee, Mokkink, Grootenhuis, Heymans, & Offringa, 2007). Irrespective of these diverging prevalence rates, having a chronic condition is a non-normative stressor that may interfere substantially with daily life (La Greca & Bearman, 2000). Pediatric psychology research has long recognized the role of the family for these children and adolescents, but the peer context has received less attention. However, peer relations, and especially peer group acceptance and close friendship support, are critical to social and emotional functioning (La Greca & Bearman, 2000). Lower acceptance and peer support have consistently been associated with increased feelings of loneliness (Baskin, Wampold, Quintana, & Enright, 2010; Kingery, Erdley, & Marshall, 2011; Vanhalst, Luyckx, & Goossens, 2014). At present, there is no consensus on whether children and adolescents with a chronic physical condition are at increased risk for perceived deficits in their peer relations, and, as a consequence, are more likely to feel lonely.

Belonging to a peer group might be more challenging for children and adolescents with chronic physical conditions for several reasons. First, these children and adolescents have been found to be at risk for school absenteeism (Boekaerts & Roder, 1999). Being frequently absent from school limits the time spent with peers, thus reducing the amount of rewarding peer-related activities (Shute & Walsh, 2005). Impaired social functioning, such as lower quality friendships, less peer acceptance, and less support from peers, has indeed been observed in children and adolescents with chronic physical conditions (Martinez, Carter, & Legato, 2011; Pinquart & Teubert, 2012). This type of social functioning, in turn, may lead to increased feelings of loneliness (Heinrich & Gullone, 2006). Second, reduced energy levels and (actual or self-imposed) physical restrictions accompanying their illness may further prevent these children and adolescents from engaging in social activities such as sports. Finally, in some illnesses, treatment-related responsibilities may prevent full participation with peers and lead to feelings of isolation and loneliness. Type 1 diabetes, for instance, requires a complex regimen of diet, blood glucose monitoring, and daily insulin administrations, which makes it more difficult for these youngster to join parties or simply go out for dinner with friends (Seiffge-Krenke, 2001).

Empirical studies that examined loneliness in children and adolescents with chronic conditions have yielded inconsistent results. Some studies have found this group to be at increased risk for loneliness (e.g., Curtin & Siegel, 2003; Storch et al., 2009), whereas other studies have found no differences (e.g., Noll, Reiter-Purtill, Vannatta, Gerhardt, & Short, 2007; Storch et al., 2008). Because of this inconsistency in findings, the present meta-analysis will not only calculate a mean effect across studies, but also aims to examine several sample and study characteristics that may explain this inconsistency in findings.

1.2 Moderators of the link between chronic physical conditions and loneliness

Type of condition. Certain types of physical conditions may be especially likely to put children and adolescents at risk for experiencing loneliness. Previous studies suggested that children and adolescents with chronic neurological conditions, such as spina bifida, are especially at risk for poorer well-being (Howe, Feinstein, Reiss, Molock, & Berger, 1993; Martinez et al., 2011; Pinquart & Teubert, 2012). Having a neurological condition often implies having impaired cognitive abilities, which are needed to understand social processes (Pinquart & Teubert, 2012). Another group that might be especially vulnerable to feelings of loneliness are individuals with hearing and visual impairments, as this type of condition impacts one's

ability to communicate with others and can disrupt interpersonal relations (Cacioppo, Grippo, London, Goossens, & Cacioppo, 2015; Wallhagen, Strawbridge, Shema, Kurata, & Kaplan, 2001). The effect of having a chronic condition on loneliness might thus be especially strong for children and adolescents with a neurological condition or with hearing or visual problems.

Study quality. Previous inconsistent findings may also have resulted from differences in several indicators of study quality. Four of these indicators are the geographical representation within the sample, the recruitment procedure used, the type of comparison being made, and the attempted controls for potentially confounding factors.

First, as regards geographical representation, studies that sampled participants from just a single site or city might yield less representative results than studies that sampled from multiple sites or cities in one area, or from multiple areas. Second, as regards the recruitment procedure used, results may differ for select and aselect samples. A previous meta-analysis on well-being in children of Holocaust survivors, for instance, found an effect for studies using convenience samples only (e.g., samples recruited through Holocaust survivor meetings). For studies using aselect samples (e.g., samples recruited from a population registry), no effect was found (Van IJzendoorn, Bakermans-Kranenburg, & Sagi-Schwartz, 2003). Similarly, different effects on psychological well-being can be expected when participants were sampled from patient organizations as compared to clinics or registries, as members of patient organizations may represent a selective subsample of the total population. Third, as regards the type of comparison group used, results may be different for studies that relied on healthy peers or a community sample. Studies including a sample of healthy peers explicitly checked whether participants in this group had a chronic condition and excluded the participants that reported a chronic condition from the sample. Studies including a community sample as a control group did not explicitly check the presence of a chronic illness and therefore may include some participants with a chronic condition as well. Larger effect sizes can be expected when healthy peers were used, as compared with a community sample, but there is no research yet to confirm this.

Fourth, as regards the attempted controls for potentially confounding factors, results may be different depending on whether or not matching procedures (or proxies thereof) are used. Matching implies that for each individual with a chronic condition a healthy counterpart is selected based on demographic variables, such as gender and age. This procedure effectively

rules out the potential confounding effects of these variables. Few meta-analyses have examined the effect of matching, but it has been suggested that effect sizes are larger when matching was conducted (Boekaerts & Roder, 1999). As a proxy for matching, researchers can sample the control group from the same classroom as the group with chronic conditions. Classroom peers are likely to be of similar age and to live in similar neighborhoods. Similar to matching, therefore, sampling controls from the same classrooms as the target children or adolescents results in better estimates of the population effect. However, studies examining this moderator effect are scarce again.

Additional moderators. Other study and sample characteristics that may lead to different results include the year in which the study was published, the country in which it was conducted, the type of loneliness measure that was used, the gender ratio in the sample, and participants' age. However, research on these moderators have been largely lacking.

First, the year in which the study was published may lead to different results, because definitions and diagnoses of chronic conditions changed considerably over the years (Ferro & Boyle, 2013). Second, having a chronic condition might lead to different experiences and outcomes in different countries, for example, due to different care facilities. Research on this topic, however, is lacking. Third, different measures have different measurement characteristics, which may have an effect on the estimates obtained. Fourth, the link between chronic physical condition and loneliness may be different for boys and girls. However, we did not expect a large effect, because a previous meta-analysis on the link between chronic conditions and social functioning did not find a moderating effect of gender (Pinquart & Teubert, 2012). Fifth, the age of the participants might influence the results, as peers become more important and potential dissatisfaction in one's relationships with peers becomes more likely as children grow older and move into adolescence (Qualter et al., 2015). However, few studies examined whether the impact of having a chronic condition on one's social life varies with age. Previous meta-analyses on children and adolescents with chronic physical conditions that examined the moderating effect of age yielded mixed results. Age did not moderate the association between having a chronic condition and depressive symptoms (Pinquart & Shen, 2011b) or social functioning (Pinquart & Teubert, 2012). However, larger associations between having a chronic condition and internalizing problems were found with increasing age (Pinquart & Shen, 2011a).

1.3 The present study

The aim of the present study was to conduct a meta-analysis on loneliness in children and adolescents with chronic physical conditions compared to their healthy peers, as empirical findings so far have been inconsistent. In addition to examining the overall effect of having a chronic condition on loneliness, we aimed to examine several study and sample characteristics that may moderate this effect, including the type of condition, the geographical representation within the sample, recruitment and matching procedures, publication year, the country the study was conducted in, the loneliness instrument used, and gender and age of the participants.

2. Method

2.1 Identification of studies

The present study is part of a larger meta-analysis on loneliness. For this larger project, we aimed to include all studies that used one of the main standardized loneliness questionnaires. These studies were obtained through a literature search conducted in the data bases PsychInfo, ERIC, PubMed, and Web of Science, and by checking reference lists and contacting experts in the field. This literature search has been described in more detail elsewhere (Maes, Qualter, Vanhalst, Van den Noortgate, & Goossens, 2016). The literature search resulted in 3,724 studies. Of these 3,724 potential studies, a total of 1,374 studies did not actually use one of the loneliness measures, but only referred to it, for example, in the Introduction. Of the remaining eligible 2,350 studies, a total of 281 studies were excluded for different reasons. First, 66 studies turned out to be exact duplicates of other articles in the dataset. Second, 206 studies were excluded, because they were written in a language other than Dutch, English, French, or German. Finally, we could not retrieve the full-text version of 9 studies. The remaining 2,069 studies were read in depth, after which 246 studies were excluded. These studies reported that a loneliness measure had been administered, but did not report any numeric information for this measure such as descriptives or univariate statistical tests. From the remaining 1,819 studies that were coded for this larger project, we selected the 57 studies that included children and adolescents with chronic physical conditions. Of these studies, 18 were excluded from the present analyses for different reasons. Some studies were based on the same sample of participants as other studies included in the present meta-analysis (n = 6), did not provide the statistical information necessary for the present analyses (n = 8), or included participants that were selected because they experienced problems in peer relations, which represents a confound with our outcome

measure of loneliness (n = 1). Finally, we excluded studies that did not use the UCLA Loneliness Scale or the Children's Loneliness Scale (n = 3). These two measures were the only ones that were used in sufficiently large numbers to allow a meaningful comparison.

2.2 Data set

Our final data set consisted of 39 studies that were published between 1987 and 2014. These studies were conducted in seven different countries, namely Australia (n = 2), Belgium (n = 1), Canada (n = 4), China (n = 1), Israel (n = 3), Jordan (n = 1), and the US (n = 27). Most studies were cross-sectional (n = 28), but some were longitudinal (n = 11). About half of the studies included a control group (n = 21), whereas the others did not (n = 18). Samples included mainly children (n = 16) or adolescents (n = 23), but age ranges were often rather large, covering both childhood and adolescence. Sample sizes ranged from 10 to 429 per condition or control group. A total of 2,286 children and adolescents with a chronic physical condition and 1,330 healthy peers were included in the present meta-analysis, 52% of which were male. Information on socioeconomic status (SES) was often missing (n = 25), but some studies reported that more than 60% of the sample had low SES (n = 2), more than 60% of the sample had middle to high SES (n = 5), or the sample was of mixed SES (n = 7). Information on ethnic background was also often missing (n = 19), but some studies reported that more than 75% of the sample came from an ethnic minority group (n = 1), more than 75% of the sample came from the ethnic majority group (n = 14), or the sample was more equally mixed regarding ethnic background (n = 5).

2.3 Coding of studies

The present meta-analysis includes 39 studies (n) reporting on 63 samples (k) of which 21 were control samples. These studies were coded for all the moderators described in the Introduction.

Type of condition. To examine whether children and adolescents with certain types of conditions are more vulnerable to loneliness, we categorized the studies as follows: (1) neurological conditions (k = 6); (2) hearing and visual impairments (k = 8); and (3) other (k = 28). In addition, we examined a more specific division of condition types, including nine categories. The first category included children and adolescents with hearing (k = 7) or visual (k = 1) impairments. The second category included hematologic conditions (i.e., conditions which primarily affect the blood), such as hemophilia (k = 1) and sickle cell disease (k = 3).

The third category included children and adolescents with cancer. All studies in that category (k = 3) included participants with different types of cancer with the majority of participants suffering from leukemia or lymphoma. The fourth category included neurological conditions (i.e., conditions that often affect the nervous system), such as cerebral palsy (k = 1), epilepsy (k = 1), glycogen storage disease (k = 1), neurofibromatosis Type 1 (k = 1), and spina bifida (k = 2). The fifth category included endocrine diseases (i.e., conditions that are associated with dysfunction of the endocrine system), such as cystic fibrosis (k = 2), obesity (k = 2), short stature (k = 1), and Type 1 diabetes (k = 2). Two other samples included different conditions including nonobservable endocrine conditions (i.e., Type 1 diabetes and hypothyroidism) and observable endocrine conditions (i.e., short stature, gynecomastia, precocious puberty, and delayed puberty). The sixth category included (diseases associated with) heart conditions, such as Barth syndrome (k = 1) and congenital heart disease (k = 1). The seventh category included asthmatic and allergic conditions, such as asthma only (k = 1), allergies (anaphylaxis and other severe allergies) only (k = 1), and a mixed condition with persons with asthma and/or allergies (k = 2). The seventh category was labeled 'other conditions' and included studies on chronic pain, migraine, and rheumatoid arthritis (k = 1 in each case). The final category, labeled 'mixed' comprised studies (k = 3) that included a broad range of conditions covering almost all of the above categories.

Study quality. Four indicators for study quality were used: The geographical representation within the sample, the recruitment procedure used, the type of comparison being made, and the attempted controls for potentially confounding factors. First, geographical representation was coded as follows: (1) participants were sampled in a single city (n = 6); (2) participants were sampled in multiple cities within one geographical area (n = 12); and (3) participants were sampled in multiple geographical areas (n = 7). For 14 studies, this information was missing. Second, we coded for the recruitment procedure used when sampling children and adolescents with chronic conditions, using three categories: (1) schools, including special schools for the hearing impaired, general schools, and special classes in general schools (n = 5); (2) clinical registers and databases (n = 23); and (3) patient bodies and activities, joined voluntarily, such as patient organizations, sport teams, camps, and conferences (n = 10). Third, we coded whether the control group consisted of a community sample (1; n = 9) or a sample of healthy peers (2; n = 12). Fourth, we coded whether the condition and control groups were matched on one or more demographic variables (1) or not (0). Because almost all studies (90%)

employed a matching procedure, we did not include this moderator in the analyses. In addition, we coded whether participants in the condition and control groups came from the same classroom (1; n = 11) or not (0; n = 10).

Additional moderators. First, year of publication was included as a continuous variable, centered around the year of publication of the oldest article included (i.e., 1987). Second, to examine the moderator reflecting the country in which the study was conducted, three categories were used, that is, US (0; n = 27); Western non-US countries (1; n = 7); and non-Western countries (2; n = 5). Third, the loneliness questionnaire used was coded as (0) the Children's Loneliness Scale (n = 32); and (1) the UCLA Loneliness Scale (n = 7). Fourth, gender ratio was coded as the proportion of males in the study. Information was available for 38 studies and the proportion ranged from 0.21 to 1.00 (M = 0.52, SD = 0.17). Fifth, regarding age, we did not simply use the two categories of children and adolescents, because many studies recruited participants from both age groups. Rather, we included a continuous moderator representing the mean age of the sample. This information was available for 35 of the studies and the mean age ranged from 5.5 to 19.89 years (M = 12.79, SD = 2.76). To assist in the interpretation of the effect obtained, the moderator 'age' was centered around a mean age of 5 years.

2.4 Effect size calculations

Effect sizes were calculated in two ways. First, we calculated standardized mean differences. We computed Hedges' g (Hedges, 1981) for each study, by subtracting the loneliness mean of the control peers from that of participants with chronic conditions and dividing the resulting scores by the pooled standard deviation (Lipsey & Wilson, 2001). A positive effect size, therefore, reflects higher loneliness scores for participants with chronic conditions than the control peers. For all effect sizes, we applied Hedges' small-sample correction (Lipsey & Wilson, 2001). The resulting effect sizes were then averaged across studies to arrive at a standardized mean difference between children and adolescents with chronic physical conditions and controls. A drawback of this approach is that only the 21 studies including a control group can be included in the analyses.

In the alternative approach (loneliness mean scores), we aimed to include the information from the 18 studies without a control group as well. The general strategy is not to engage in pairwise comparisons of target children and adolescents vs. controls using an effect

size, such as Hedges' *g*, and to average these effect sizes. Rather, mean loneliness scores of the samples with children and adolescents with chronic conditions and of the samples with control peers are used as the outcome variable in a meta-regression analysis. To examine the overall effect (i.e., the difference between target children and adolescents and controls), a predictor is added to this model which is coded as 0 = not having a chronic condition and 1 = having a chronic condition. A complication with this alternative approach is that the mean scores of the included studies could not be easily compared, because they were based on two different loneliness questionnaires, each with a different number of response categories. Therefore, we computed standardized means. To compute these standardized means, we first computed a pooled standard deviation across all control groups, for each loneliness measure separately. Second, we computed a weighted overall mean across all control groups, again separately for each loneliness measure. Next, we subtracted this overall mean from the means of each chronic condition and control group, and divided the resulting score by the pooled standard deviation.

2.5 Statistical analyses

For all analyses, effect sizes (or standardized means) were weighted by the inverse variance (Lipsey & Wilson, 2001), meaning that samples with higher precision get a greater weight in the analyses. First, we conducted analyses based on Hedges' g using a random effects model with, in addition to the sampling variance, two random effects (Van den Noortgate, López-López, Marín-Martínez, & Sánchez-Meca, 2013). A first random effect reflected between-study variance, because we did not assume that there is a common population effect for all studies, but rather that characteristics of the study may influence the results. In addition, it might be that effect sizes based on participants with the same chronic condition are more similar than effect sizes based on participants with different conditions. Hence, the second random effect reflected variance between chronic conditions.

Second, to include all available information, we conducted analyses based on the standardized means of loneliness. A predictor was added to this model that reflected whether the sample was based on participants with a chronic condition or on the control group. In such a model, the intercept reflects the estimate for the mean expected loneliness score across all control groups. The slope reflects the estimate for the mean difference in loneliness across the studies, between all control groups, on the one hand, and all chronic condition groups, on the other hand. Again, a random study effect was added, both for the intercept and the slope. As

the effect of having a chronic condition (i.e., the slope) may depend on the type of condition participants have, a random effect reflecting the effect of the specific chronic condition was added to the slope as well.

To examine whether the effect of having a chronic condition varied according to study and sample characteristics, we conducted moderator analyses using mixed-effects models. This means that we included the same random effects as for the mean effect analyses described above, but also included fixed effects for the moderators. These moderator analyses were conducted using the standardized loneliness means, and each moderator was examined in a separate model. Analyses were conducted with the procedure Mixed from SAS 9.3 using restricted maximum likelihood (REML) as estimation method (Littell, Milliken, Stroup, Wolfinger, & Schabenberger, 2006). Mean and moderating effects were statistically tested by means of a Wald test, comparing the ratio of the estimate over the corresponding standard error estimate to a t-distribution, with degrees of freedom estimated using the Satterthwaite (1946) method.

3. Results

3.1 Loneliness in children and adolescents with chronic physical conditions

The analyses based on the standardized mean differences from the 21 studies with a control group yielded a significant, but small effect of $g = 0.16$ ($SE = 0.06$, $p = .021$, and 95% CI [0.03, 0.29]). Recall that a positive effect size indicates higher loneliness scores for participants with chronic conditions than the control peers. Including the same 21 studies, the alternative strategy using standardized means yielded an effect of 0.15 ($SE = 0.07$, $p = .049$, and 95% CI [0.00, 0.31]). As these results are very similar, we further discuss only the results of the alternative strategy, enabling us to include information from all 39 studies. A caterpillar plot of all standardized means, separately for the control and chronic condition groups is presented in Figure 8.1. Analyses based on the 39 studies yielded a significant, but small difference in standardized means of 0.18 ($SE = 0.07$, $p = .029$, and 95% CI [0.02, 0.33]). Three of the standardized means could be considered as outliers as they were more than two standard deviations above the mean. Two of these outliers came from the same study and reflected the loneliness mean for the control and chronic condition group. The third outlier came from a study with only a chronic condition group. Analyzing the data without these three outliers again yielded a significant but small effect of 0.19 ($SE = 0.07$, $p = .010$, and 95% CI [0.05, 0.33]).

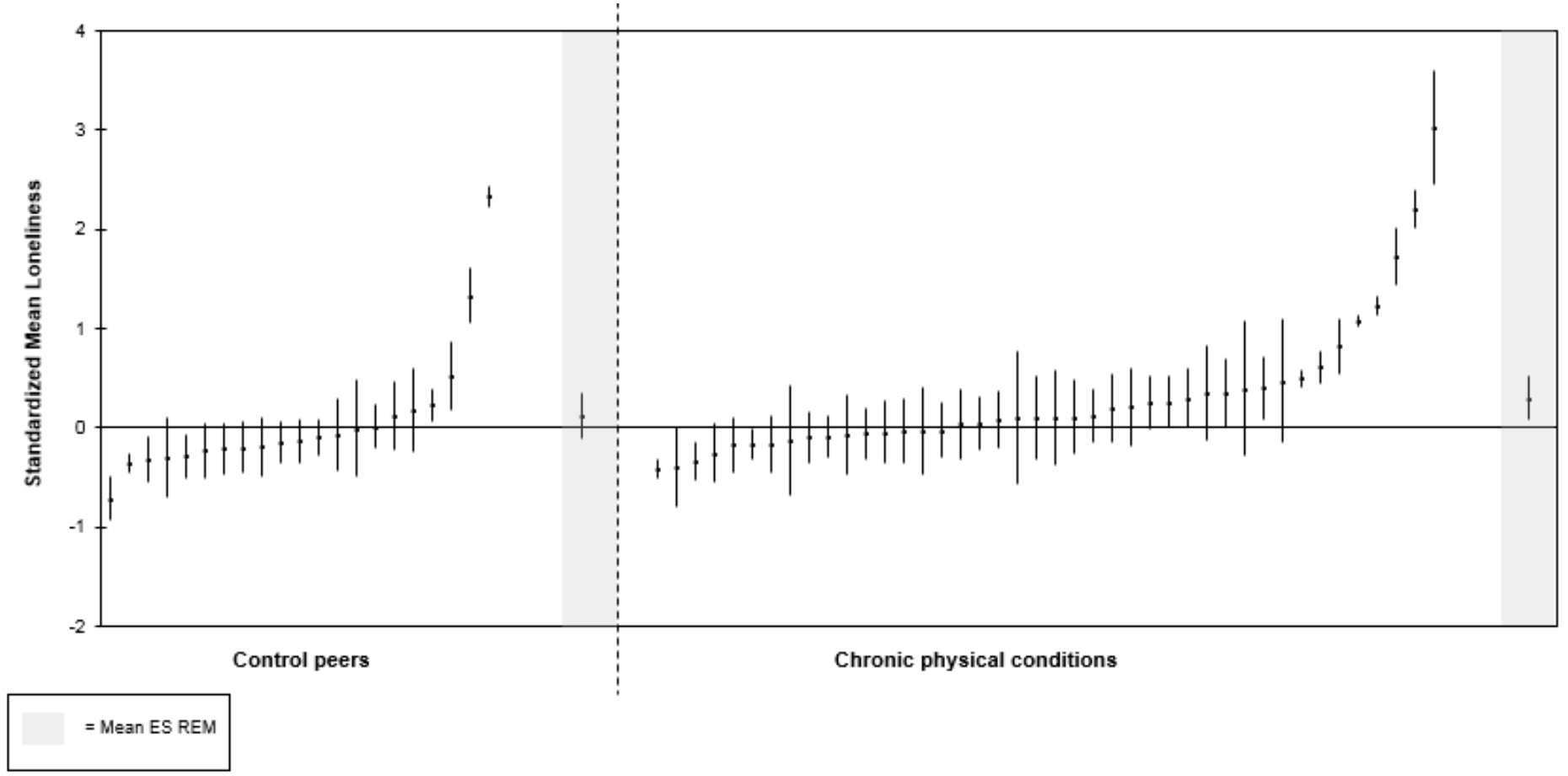

Figure 8.1. Sorted caterpillar plot of the standardized loneliness means for children and adolescents with chronic physical conditions and control peers, with 95% confidence intervals.

Table 8.1

Separate Regression Analyses for the Moderators Predicting Standardized Means of Loneliness

Moderator	Effect of condition (SE)	$F_{interaction}$ (df)	*p*
Type of condition		1.97 (2, 10.9)	.186
Neurological conditions	0.23 (0.17)		
Hearing or visual impairments	0.47 (0.16)		
Other conditions	0.13 (0.07)		
Type of condition		1.65 (8, 21.9)	.169
Hearing or visual impairments	0.47 (0.20)		
Hematologic conditions	0.18 (0.21)		
Cancer	-0.10 (0.27)		
Neurological conditions	0.24 (0.20)		
Endocrine diseases	0.00 (0.17)		
Heart conditions	0.29 (0.20)		
Asthma and allergies	0.11 (0.31)		
Other conditions	0.20 (0.18)		
Mixed samples	0.42 (0.31)		
Geographical representation		1.71 (2, 26.6)	.201
1 city	0.16 (0.10)		
>1 city, 1 area	0.02 (0.10)		
>1 area	0.29 (0.11)		
Recruitment procedure		8.25 (2, 18.6)	**.003**
Schools	0.33 (0.11)		
Clinical registers	0.09 (0.06)		
Patient bodies and activities	0.91 (0.21)		
Control group		0.00 (1, 36)	.963
Community sample	0.19 (0.10)		
Healthy peers	0.19 (0.09)		
Same classroom		0.89 (1, 36)	.351
No	0.24 (0.09)		
Yes	0.14 (0.09)		
Publication year	0.01 (0.01)	2.83 (1, 56.0)	.098
Country		0.05 (2, 32.7)	.947
US	0.21 (0.08)		
Western non-US countries	0.17 (0.15)		
Non-Western countries	0.24 (0.14)		
Loneliness questionnaire		0.24 (1, 56.0)	.630
CLS	0.21 (0.07)		
UCLA	0.16 (0.11)		
Proportion male	0.41 (0.33)	1.57 (1, 44.4)	.217
Mean age	-0.01 (0.03)	0.09 (1, 44.4)	.770

Note. The models testing the interaction effects of Type of Condition could not be estimated. These models were therefore simplified by omitting the random effect of type of condition. For the three continuous variables, the column "Effect of conditon" represents the moderator effect. CLS = Children's Loneliness Scale; UCLA = UCLA Loneliness Scale.

Furthermore, we examined how the total variance was decomposed over sampling variance and the three random effects. As the sampling variance depends on the study size, we used the median sampling variance for this calculation. The between-study variance for the intercept (0.14, $\chi^2 = 163.2$, $p < .001$) was significant and represented 68.6% of the total variance (68.6% of the variance between the control group means therefore cannot be explained by sampling variance). This means that there was systematic variance between studies in the level of loneliness in the control groups. For the slope, no between-study variance was found (0.00, $\chi^2 = 0.0$, $p = 1$), but there was evidence for systematic variance among types of conditions (0.04, $\chi^2 = 5.7$, $p = .02$).

3.2 Moderators of the link between chronic physical conditions and loneliness

Each moderator was tested in a separate model, for which the results are presented in Table 8.1. For all variables, except for Type of condition, a main effect was also included in the model. However, in order to save space and facilitate interpretation, only the results regarding the moderation effects are presented. None of the moderator effects was significant, except for Recruitment procedure. Participants recruited from patient bodies and activities, such as patient organizations, sport teams, camps, and conferences, were found to be more lonely than their control peers.

4. Discussion

The present meta-analysis examined loneliness in children and adolescents with chronic physical conditions as compared to control peers. We found a small effect, suggesting that children and adolescents with chronic conditions are, on average, somewhat lonelier than their peers without such conditions. This increased risk for feelings of loneliness might have resulted from a reduced amount of peer-related social activities due to, for example, school absenteeism, reduced energy levels, physical restrictions, or illness-related responsibilities (Boekaerts & Roder, 1999; Martinez et al., 2011; Pinquart & Teubert, 2012). However, future research is necessary to unravel the underlying mechanisms that may explain this increased risk for feelings of loneliness.

Recognizing feelings of loneliness is important when treating children and adolescents with chronic physical conditions, as these feelings may have detrimental effects not only on their mental, but also on their physical well-being. Longitudinal studies that focused on children and adolescents from the general population found that loneliness was associated over time

with a higher frequency of visits to the doctor, lower self-reported general health, and higher sleep dysfunction, while controlling for earlier reported health problems (Harris, Qualter, & Robinson, 2013; Qualter et al., 2013). Longitudinal research focusing on adolescents with a chronic condition (i.e., congenital heart disease) further showed that patients high on loneliness experienced more cardiac symptoms, and had more difficulties in communicating with clinicians and in accepting their physical appearance (Vanhalst et al., 2013).

4.1 Moderators of the link between chronic physical conditions and loneliness

In addition to examining the overall effect of having a chronic condition, we examined several study and sample characteristics that may moderate this effect. Our results suggested that the link between chronic conditions and loneliness does not vary according to the geographical representation within the sample, whether the condition and control group were sampled from the same classroom, the publication year or the study, the country the study was conducted in, the loneliness instrument used, and the gender and age of the participants. However, the effect of having a chronic condition on loneliness scores did vary according to the recruitment procedure employed. The strongest effect of having a chronic condition on loneliness was found for studies that recruited children and adolescents from patient bodies and activities. Such a procedure likely results in a select sample, as joining these patient bodies and activities (e.g., patient organizations, sport teams, camps, and conferences) is voluntary. It could be that members of these organizations are more concerned with their chronic condition or encounter more obstacles in daily life. Another potential explanation is that children and adolescents who feel lonely are more inclined to join such organizations to find companions. It would be interesting for future research to examine whether joining these organizations helps in alleviating feelings of loneliness over time.

We also examined the moderating effect of type of condition, and expected that the effect of having a chronic condition on loneliness scores was especially strong for children and adolescents with a neurological condition or with hearing or visual problems. However, we did not find evidence for this hypothesis. A possible explanation for this unexpected finding is that a categorization based on body systems or types of chronic conditions might not be very helpful when examining psychological and social variables (Perrin et al., 1993; Stein & Jessop, 1989). In fact, most studies included in the present meta-analysis examined children and adolescents with a specific chronic condition as if they constitute a more or less homogeneous group (Meijer,

Sinnema, Bijstra, Mellenbergh, & Wolters, 2000; Sattoe, Hilberink, Van Staa, & Bal, 2014). However, considerable variation in daily functioning have been reported among children and adolescents with the same chronic condition (e.g., Boekaerts & Roder, 1999; Meijer et al., 2000; Sawyer, Drew, Yeo, & Britto, 2007). Hence, alternative categorizations based on dimensions of these chronic conditions that cut across diagnostic boundaries have been proposed in the literature.

4.2 An alternative categorization

An example of such an alternative categorization has been proposed by Perrin et al. (1993). Their model includes 13 continuous variables that can be scored for each child or adolescent individually. Examples of these variables include the duration of the condition (ranging from brief to lengthy), limitation of age-appropriate activities (ranging from no limitations to unable to conduct), and visibility (ranging from not visible to highly visible). These illness-related variables have been rarely examined in the context of loneliness. The few studies that have been conducted showed that loneliness was not associated with either duration of the condition or with objective ratings of illness severity (Brown, Connelly, Rittle, & Clouse, 2006; Noll, Reiter-Purtill, Moore, et al., 2007; Schorr, 2006; Vannatta et al., 2008). Regarding illness visibility, research found higher loneliness scores in children and adolescents who reported higher illness visibility (Curtin & Siegel, 2003). Examining illness-related variables is not only relevant for researchers interested in loneliness, but also represents a promising approach when examining other psychological and social variables, such as depressive symptoms and peer group functioning (e.g., De Ridder, Geenen, Kuijer, & Van Middendorp, 2008; Meijer et al., 2000; Newacheck & Taylor, 1992; Stein & Jessop, 1989). Unfortunately, in the present meta-analysis, we were not able to adopt this alternative categorization, as insufficient information was provided on illness-related variables in the included studies.

4.3 Suggestions for future research

In addition to employing this alternative categorization, which focuses on individuals rather than conditions, reviewing the literature on loneliness in children and adolescents with chronic physical conditions led us to formulate several other suggestions for future research. First, as a research community, we should aim to base our conclusions on a set of studies that is representative of the global population of children and adolescents with chronic conditions. For example, 69% of the studies included in the present meta-analysis were conducted in the

US. Second, the majority of studies did not report on the socioeconomic and ethnic status of the participants. We would like to urge researchers to include information on these demographic characteristics of their sample in their research reports. Third, as individuals with a specific chronic condition constitute a very heterogeneous group, it is important for future research to include more information on illness-related variables, such as disease severity and treatment intensity, even when a categorization based on diagnoses is used.

4.4 Conclusion

The present meta-analysis found that children and adolescents with chronic physical conditions are somewhat lonelier than their control peers. However, as individuals with a chronic condition constitute a very heterogeneous group, even within specific conditions, focusing on diagnoses might not be very helpful when examining psychological and social variables. An alternative categorization has been proposed that aims to classify children and adolescents based on illness-related variables rather than conditions. We hope that future research using this categorization may yield additional information on loneliness in children and adolescents with chronic physical conditions. In the meantime, caretakers and health care providers should be aware of and pay attention to the risk of loneliness in this group of children and adolescents.

9

Gender Differences in Loneliness Across the Lifespan

Maes, M., Qualter, P., Vanhalst, J., Van den Noortgate, W., & Goossens, L. (2016). *Gender differences in loneliness: A meta-analysis*. Manuscript in preparation.

Abstract

Gender differences in loneliness have been examined in many empirical studies, but results have been largely inconsistent. As loneliness is a universal phenomenon that can be experienced throughout life, the present meta-analysis aims to synthesize the available evidence on gender differences in loneliness across the lifespan. We analyzed 662 effect sizes from 552 studies published between 1978 and 2014, covering a total of 323,446 individuals. To account for dependencies among effect sizes, multilevel meta-analyses were conducted. Results showed a close-to-zero overall effect (g = 0.05), suggesting that males are slightly lonelier than females. Furthermore, gender differences were moderated by age and loneliness type. No gender differences were found for children and adolescents, and only small differences were found for college students and adults, indicating that males were slightly lonelier than females. For the elderly, type of loneliness seemed to matter as our results suggest that males experienced somewhat more relational loneliness, whereas females experienced somewhat more intimate loneliness. Importantly, all effects were small and suggest that males and females across the lifespan are more alike than they are different regarding mean levels of loneliness.

1. Introduction

Loneliness is a universal phenomenon that can be experienced throughout life (Qualter et al., 2015). Although most people have felt lonely at some point in life, people differ in the frequency, duration, and intensity of loneliness they experience. Gender is one factor that may explain this variation in loneliness. Gender differences in loneliness have been frequently examined, but theoretical contentions are scarce and conflicting, and findings have been largely inconsistent (Weeks & Asher, 2012). The present meta-analysis aimed to synthesize the available evidence and to examine whether gender differences in loneliness vary according to the age group being studied. Also, we examined whether gender differences in loneliness vary in size or direction according to which loneliness measure was used, or sample characteristics, including the country the study was conducted in, and the socioeconomic and ethnic background of the participants.

1.1 Loneliness across the lifespan

Loneliness is defined as the unpleasant feeling that occurs when people perceive their network of social relationships to be deficient in a quantitative or qualitative way (Perlman & Peplau, 1981). According to the evolutionary theory of loneliness (Cacioppo, Cacioppo, et al., 2015), the social pain of loneliness serves as a warning system that (1) signals to people that something is missing in their social relationships and (2) motivates them to reconnect to significant others. Across the lifespan, sources of loneliness differ (see for a review Qualter et al., 2015). For children and early adolescents, parents occupy a central position in their personal network, but gradually this position is taken over by friends and later by a romantic partner. Also, there seem to be different transition periods across the lifespan where people are especially vulnerable to experiencing loneliness, such as during adolescence, motherhood or old age.

Many studies have examined the detrimental effects of loneliness and showed that lonely people have more psychological problems, such as depression and anxiety, more physical health problems, such as sleep problems and cardiovascular incidents, become ill more quickly, and pass away at an earlier age (see for reviews Ernst & Cacioppo, 1999; Goossens et al., 2015; Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015). These detrimental effects have mainly been studied in adults, but similar effects have been found in childhood and adolescence (Doane & Thurston, 2014; Harris, Qualter, & Robinson, 2013; Heinrich & Gullone,

2006; Qualter et al., 2013). Hence, it is important to examine loneliness across the lifespan. Our main question in this meta-analysis is whether there are gender differences in loneliness, and whether that pattern is the same across the course of the human lifespan.

1.2 Male and female differences in loneliness: Myth or reality?

Loneliness has received increasing attention from both researchers and policy makers over the last decade, with the question about gender differences in loneliness being asked many times. There are different ideas about whether gender differences exist: some suggest that males and females are equally lonely, while others argue that we should expect males to be lonelier than females or females to be lonelier than males.

1.2.1 Males and females are equally lonely

The evolutionary theory of loneliness (Cacioppo, Cacioppo, et al., 2015) views loneliness as an innate biological warning system that signals to people, both males and females, that something is missing in their network of social relationships. This theory builds on the need to belong theory (Baumeister & Leary, 1995), which states that humans have a fundamental desire to form social attachments. The need to belong and the signaling function of loneliness are thought to be universal and innately prepared, which means that gender differences are unlikely. Because loneliness is innately prepared and serves to increase human survival, it is not evolutionarily neutral, and a substantial degree of heritability can be expected. Indeed, heritability estimates obtained across studies have been found to be remarkably similar, and just below 50% (Goossens et al., 2015). Moreover, a large heritability study indicated that there were no gender differences in the heritability estimate of loneliness (Boomsma, Cacioppo, Slagboom, & Posthuma, 2006).

In addition, empirical work on concepts related to loneliness have shown that males and females are relatively similar. For example, it was found that, in general, females orient more toward dyadic, close relationships, whereas males orient more toward the larger group (Baumeister & Sommer, 1997). However, males and females were found to be equally social and take comparable care about how they relate to others. Thus, males and females need to feel they belong, but their foci are within different social spheres. Similarly, a review paper by Gardner and Gabriel (2004) showed that, when individuals define themselves, females emphasized dyadic attachments, whereas males emphasized group-based bonds, but, again, males and females did not differ in overall importance of social bonds in the definition of their

self. A review on gender differences in peer relation processes in childhood and adolescence (Rose & Rudolph, 2006) also provides evidence for the idea of equal sociability, but with different foci. The review showed that males and females get different provisions in their friendships, but do not differ on friendship satisfaction.

To summarize, some previous theoretical and empirical work provides evidence that both males and females seek social contact and suffer when social needs are unfulfilled. In particular, many theoretical and empirical studies support the hypothesis that males and females are equally lonely across the lifespan.

1.2.2 Males are lonelier than females

Other researchers claim that males are lonelier than females. It has been suggested that, while there are no gender differences in childhood, males become lonelier than females during adolescence (Koenig & Abrams, 1999). This hypothesis has been explained by arguing that although most adolescents, as compared with children, spent less time with their family, this pattern was stronger for males. Moreover, it was hypothesized that time spent with family was replaced with time spent with peers for females, but with time spent alone for males. However, higher levels of aloneness (an objective state of being alone) do not necessarily lead to higher levels of loneliness (Larson, 1990).

In addition to research suggesting that males become lonelier than females in adolescence, other researchers have suggested that males become lonelier than females only when they enter college or university. The transition to college or university often implies social challenges, such as moving away from home, leaving the social network built up during high school, and trying to form a new social network at college (Sladek & Doane, 2015). Some researchers have suggested that males are especially vulnerable to loneliness in this period of life because male students are less involved in emotional relationships, report more often that they do not know how to go about making a friend, and have greater difficulty in adjusting to relationship dissolution (Knox, Vail-Smith, & Zusman, 2007; Schultz & Moore, 1986).

Evidence supporting the hypotheses presented in this section is scarce, and more research is necessary to draw strong conclusions. Nevertheless, the age range or developmental period in which a study is conducted could influence whether gender differences are found and might be one explanation of the inconsistency in findings regarding gender differences in loneliness.

1.2.3 Females are lonelier than males.

In addition to researchers suggesting no gender differences in loneliness and researchers suggesting that males are lonelier than females, other researchers have hypothesized that females are lonelier than males. These hypotheses are often derived from theoretical models of internalizing problems in general and depression in particular, and based on the assumption that loneliness can be categorized as an internalizing problem. For example, in a review study (Martel, 2013), sexual selection evolutionary theory was used to explain the common finding that females are more at risk for adolescent-onset internalizing problems. This theory suggests that adolescence, and in particular puberty, is a critical period for females, because they become more sensitive to interpersonal aspects of the social environment. In addition, it was argued that females have more negative emotionality and more effortful control than males, with both characteristics being linked to the development of internalizing problems. A review paper on gender differences in depression presented several explanations for higher depression scores in females as compared with males from adolescence onwards (Nolen-Hoeksema, 2001). In that study, it was argued that females are hyper-responsive to stress and tend to use rumination as a coping style, which in turn leads to more depressive symptoms. Given the strong association between loneliness and depression across the lifespan (Hawkley & Capitanio, 2015), and the common categorization of loneliness as an internalizing problem (Creemers, Scholte, Engels, Prinstein, & Wiers, 2012; Romero & Epkins, 2008; Vanhalst et al., 2012), according to these theories, we would expect females to be lonelier than males, with the difference emerging in adolescence.

Another argument for females being lonelier than males has been proposed in the literature, with a specific focus on the elderly. In a meta-analysis on gender differences in psychological well-being in the old age (Pinquart & Sorensen, 2001a), it was argued that females might be more vulnerable to loneliness because they tend to live longer and are, therefore, more likely to be widowed, to be physically limited, and to require more health care. That hypothesis, together with the hypotheses based on internalizing problems, also suggest that gender differences in loneliness may vary according to the age period studied.

1.3 Moderation of gender differences in loneliness

Several sample and study characteristics may explain the inconsistency in findings of gender differences in loneliness. First, the age range or developmental period in which a study

is conducted could influence the gender differences found. The theoretical contentions suggesting gender differences in loneliness all hypothesized that these differences would appear in certain developmental groups, including adolescents, college and university students, and the elderly. Therefore, in the current meta-analysis, we will examine whether gender differences in loneliness vary with age, focusing on differences between children, adolescents, university students, adults, and the elderly.

Second, gender differences may vary according to the type of loneliness that was examined. Recently, three types of loneliness were distinguished in the literature, integrating different previous categorizations of types of loneliness: intimate, relational, and collective loneliness (Cacioppo, Grippo, London, Goossens, & Cacioppo, 2015). Intimate - or emotional - loneliness is the feeling of lacking a close, intimate attachment to another person. This perceived absence of a significant other may refer to different relationships across the lifespan, including a parent, best friend, or a romantic partner. Relational - or social - loneliness is the feeling of lacking a network of social relationships, and may refer to different networks, including a family, a group of friends, or classroom peers. Collective loneliness refers to experienced discrepancies in one's valued social identities and connections with similar others. These similar others are not necessarily known and constitute broader groups, such as one's school, neighborhood, or cultural group. Because females orient more toward dyadic, intimate attachments (Baumeister & Sommer, 1997; Gardner & Gabriel, 2004), they might experience less intimate loneliness than males (Hoza, Bukowski, & Beery, 2000). However, one could also argue that precisely because females value dyadic relationships, they are especially vulnerable in this regard and may experience more intimate loneliness than males. Opposing hypotheses can also be proposed regarding relational loneliness; because males orient more toward to the group, they might experience less relational loneliness; or, precisely because groups seem to be more important for males, they are more vulnerable in this regard and experience more relational loneliness. Collective loneliness has received far less attention in the literature and no hypotheses on gender differences in this type of loneliness have been suggested.

Third, gender differences may vary according to the specific relationship in which loneliness is experienced, whether that is within relationships with peers, family, or a romantic partner. Females might experience less loneliness in relation to the family because they tend to live in a more protected family environment with higher family support than males (Musetti, Corsano, Majorano, & Mancini, 2012). However, it could also be argued that because the family

context is more important for females, they have higher expectations that are more difficult to meet, making them more vulnerable to loneliness (Maes, Klimstra, Van den Noortgate, & Goossens, 2015). Opposing hypotheses can also be proposed in relation to gender differences in loneliness regarding relationships with peers or a romantic partner (Kuttler & La Greca, 2004; Maes, Klimstra, et al., 2015; Musetti et al., 2012; Zimmer-Gembeck, 2002). It could be argued that females invest more in, and expect more from, their peers and a romantic partner than males. These higher expectations might not be met, and girls might experience more loneliness in these relationships than boys. However, it could also be argued that this higher investment leads to higher perceived support, which would result in lower levels of loneliness. Only a few studies examined gender differences in these relation-specific types of loneliness, with results pointing in different directions (e.g., Corsano, Majorano, & Champretavy, 2006; DiTommaso & Spinner, 1993; Maes, Klimstra, et al., 2015; Musetti et al., 2012; Qualter, Quinton, Wagner, & Brown, 2009).

Fourth, other sample and study characteristics may explain the inconsistency of findings on gender differences in loneliness. There is not much research on these characteristics, thus, our examination of these moderators is exploratory. Previous studies have found larger gender differences in more individualistic cultures than in more collectivistic cultures regarding personality traits (Costa, Terracciano, & McCrae, 2001) and the intensity of powerless emotions (i.e., fear, sadness, shame, and guilt; Fischer, Rodriguez Mosquera, Van Vianen, & Manstead, 2004). We examined whether this is the case for gender differences in loneliness as well. In addition, we analyzed whether gender differences in loneliness vary according to the socioeconomic and ethnic background of the participants. Further, we explored whether gender differences in loneliness are dissimilar in clinical and non-clinical samples. Finally, we investigated whether gender differences vary according to the representativeness of the sample.

2. Method

2.1 Literature search

We searched for empirical studies on loneliness in general, regardless of whether the study of gender differences was an explicit study goal, to be sure that no relevant studies were excluded. We aimed to include all studies that measured loneliness with one of the main standardized loneliness measures. These loneliness measures were the Children's Loneliness Scale (CLS; Asher, Hymel, & Renshaw, 1984), the Differential Loneliness Scale (DLS;

Schmidt & Sermat, 1983), the Loneliness and Aloneness Scale for Children and Adolescents (LACA; Marcoen, Goossens, & Caes, 1987), the Peer Network and Dyadic Loneliness Scale (PNDLS; Hoza et al., 2000), the Relational Provisions Loneliness Questionnaire (RPLQ; Hayden, 1989), the Social and Emotional Loneliness Scale for Adults (SELSA; DiTommaso & Spinner, 1993), and the University of California Los Angeles Loneliness Scale (UCLA Loneliness Scale; Russell, Peplau, & Cutrona, 1980). We conducted the literature search in the following databases: PsychInfo, ERIC, PubMed, and Web of Science, using key terms that reflected the names of the loneliness measures. For example, for the UCLA loneliness Scale, we used the search strings ("UCLA Loneliness Scale" or "UCLA Loneliness Questionnaire") and ((UCLA) and (lonel* or "perceived social isola*")). This search resulted in 3,660 articles. Furthermore, we checked the reference lists of the studies obtained in this search and contacted experts in the field for relevant articles. In this way, we obtained an additional 64 articles. The literature search was completed in August 2014.

2.2 Inclusion and exclusion criteria

Of the 3,724 potential articles, a total of 1,374 articles did not use one of the standardized loneliness measures, but only referred to it, for example, in the Introduction. Of the remaining eligible 2,350 articles, a total of 281 articles were excluded for different reasons. First, 66 articles turned out to be duplicates of other articles in the present dataset. Second, we excluded a further 206 articles because they were written in a language other than Dutch, English, French, or German. Finally, we could not retrieve the full-text version of 9 articles. The remaining 2,069 articles were read in depth, after which 246 articles were excluded. These studies reported that a loneliness measure had been administered, but did not report numeric information for this measure such as descriptives or univariate statistical tests.

Of the remaining 1,823 articles, 514 articles reported on gender differences in loneliness in 574 studies (i.e., some articles included multiple studies on multiple datasets). Some of these studies yielded multiple effects because they included multiple questionnaires or multiple subscales within a multidimensional questionnaire, resulting in a total of 691 potential effects. For 457 of these effects, sufficient statistical information was reported to calculate an effect size. For 234 effects, information on gender differences was provided, but insufficient statistics were reported to calculate an effect size. For 205 of these effects we could calculate an effect

size when making assumptions that we will describe in more detail below (see Effect Size Calculations). Hence, the final dataset included 662 effect sizes from 552 studies.

2.3 Study coding

A manual was developed to guide the coding of studies. Undergraduate and graduate students in psychology were trained by the first author to code the articles until they reached a sufficient level of expertise. All articles coded by the students were checked by the first author to verify that the rules described in the manual had been applied correctly. The present dataset included 662 effect sizes from 552 studies in 496 articles published between 1978 and 2014. Most of these studies were cross-sectional (n = 419), whereas other studies were experimental (n = 9), longitudinal (n = 118), or diary (n = 6) studies. Sample sizes varied from 22 to 26,116 participants. A total of 323,446 individuals were included in the present meta-analysis, 49.70% of whom were male.

Age. To examine whether gender differences in loneliness change across developmental periods, we coded for age group. If the age range for a sample spanned more than one category, we chose the category corresponding to the mean age. We coded the following five age categories: (1) children - participants who were younger than 12 years or who were in Grade 6 or lower (n = 95); (2) adolescents - participants who were between 12 and 21 years old (n = 167); (3) college or university students - participants who were in college or university regardless of age (n = 81); (4) adults - participants who were older than 21 years, but younger than 65 years (n = 81); and (5) elderly - participants who were 65 years or older (n = 61). Note that studies that fell in the 'college or university students' category, were not included in the categories of 'adolescents' or 'adults'.

Loneliness type. To examine whether gender differences vary according to loneliness type, we coded whether the loneliness measures used in the studies reflect (1) intimate, (2) relational, or (3) collective loneliness. Not all measures could be coded, because some measures tap into both intimate and relational loneliness. In all, we could code 252 effect sizes (k), reflecting intimate loneliness (k = 34), relational loneliness (k = 216), and collective loneliness (k = 1). Because only one effect size was available for collective loneliness, we did not include this type of loneliness in the moderator analyses.

Relation-specific types of loneliness. To examine whether gender differences vary according to the specific relationship in which loneliness is experienced, we coded whether the

included loneliness scales reflect relationships with (1) peers (including friends and the larger peer group), (2) family (including individual family members and the family as a whole), or (3) a romantic partner. Not all measures could be coded because some scales did not refer to a specific relationship. In all, we could code 234 effect sizes (*k*), reflecting loneliness in relationships with peers (*k* = 193), family (*k* = 21), and a romantic partner (*k* = 20).

Individualism. The studies included in the meta-analysis were conducted in countries from different continents. Most studies (53.26%) sampled from North America, including the USA (*n* = 238) and Canada (*n* = 53). Only two studies included participants from South America with one study reporting on Peru, and the other on Argentina. The second largest group comprised studies conducted in Europe (21.74%), including the Netherlands (*n* = 32), the UK (*n* = 17), and Belgium (*n* = 15). Studies conducted in Asia comprised 18.66% of the present dataset, including Israel (*n* = 28), Turkey (*n* = 27), and China (*n* = 22). Only a few studies were conducted in Oceania (4.35%), including Australia (*n* = 23) and New Zealand (*n* = 1), and in Africa (0.54%), including Zimbabwe (*n* = 2) and South Africa (*n* = 1). A small subset of studies (1.45%) could not be categorized according to continent, because they included mixed samples from different continents. For each of the 37 countries represented in the present dataset, we took the individualism score from Hofstede's (2001) model of national culture, a score that ranges from 0 to 100. For two of the countries - Zimbabwe and Cuba - no such scores were available, so these studies were not included in the moderator analysis. Individualism scores in the present dataset ranged from 14 to 91 (*M* = 77.43, *SD* = 21.05).

Socioeconomic status. Information regarding the socioeconomic status (SES) of the participants was coded. For many studies, this information was not provided (*n* = 335; 60.69%). The other studies comprised (1) low SES samples, with 60% or more of the participants being of low SES (*n* = 38); (2) middle or high SES samples, with 60% or more of the participants being of middle or high SES (*n* = 83); and (3) mixed SES samples, with neither low nor middle or high SES categories containing more than 60% of the sample (*n* = 96).

Ethnic majority/minority status. Information regarding the ethnic majority or minority status of the participants was coded. For many studies, this information was not provided (*n* = 312; 56.52%). The other studies were classified as follows: (1) more than 75% of the participants came from an ethnic minority group (*n* = 25); (2) more than 75% of the participants

came from an ethnic majority group (n = 129); and (3) the sample was of mixed ethnic majority/minority status with neither of the categories including more than 75% (n = 86).

Clinical groups. To examine whether gender differences varied according to clinical status, we coded whether studies included participants with a physical disability or illness, special educational needs, or mental health problems. However, there were not enough studies to examine each of these categories separately. Therefore, we merged these three types of clinical groups and categorized the studies as (1) non-clinical (n = 483), (2) clinical (n = 41), or (3) mixed, which included studies that looked at both non-clinical and clinical groups (n = 28).

Sampling area. Very few studies provided information on the representativeness of their sample. Therefore, we coded the studies as follows: (1) participants were sampled in a single city (n = 291), (2) participants were sampled in multiple cities within one geographical area (n = 107), and (3) participants were sampled in multiple geographical areas (n = 95). The remaining 59 samples could not be coded due to missing information.

2.4 Effect size calculations

As effect size, we used Hedges' g, which is similar to Cohen's d (Rosenthal & Dimatteo, 2001). We calculated g by subtracting the loneliness mean of females from that of males and dividing the resulting scores by the pooled standard deviation (Lipsey & Wilson, 2001). A positive effect size, therefore, reflects a higher loneliness mean for males than females. For all effect sizes, we applied Hedges' small-sample correction (Lipsey & Wilson, 2001). The effect sizes were weighted by the inverse variance (Lipsey & Wilson, 2001), such that samples with higher precision got a greater weight in the analyses. We interpreted effect sizes based on Cohen's (1988) benchmarks, as suggested by Hyde (2005). So, we interpreted effect sizes as follows: close-to-zero ($g \leq 0.10$), small ($0.11 < g < 0.35$), moderate ($0.36 < g < 0.65$), large ($0.66 < g < 1.00$), or very large ($g > 1.00$).

When descriptive statistics (means and standard deviations) and sample sizes were provided for males and females separately, we used that information to calculate g and the corresponding standard error. When studies did not provide this information, but provided inferential statistics such as an F, t, or r value, we used the formulae presented in Lipsey and Wilson (2001) to derive g and its standard error. Using these conversions, we were able to calculate 457 effect sizes, assuming a common population standard deviation. When making addition assumptions, we were able to calculate an additional 205 effect sizes. For example, if

only a total sample size was reported, we assumed an equal sample size for males and females; if the authors reported that no significant gender differences were found, without reporting exact information on the effect size or *p*-value, we assumed an effect size of zero. To assess the sensitivity of our conclusions for the assumptions we made, we performed the meta-analyses with and without the effect sizes for which we had to make assumptions.

2.5 Statistical analyses

Because several articles reported on multiple studies and multiple effect sizes, we conducted a multilevel meta-analysis. A multilevel meta-analysis does not make the strong assumption of independence that underlies traditional meta-analytic approaches, but explicitly accounts for possible dependencies among effect sizes (Hox, 2002; Van den Noortgate, López-López, Marín-Martínez, & Sánchez-Meca, 2013). Specifically, the model included three kinds of random variation, in addition to the sampling variance of the observed effect sizes. A first random effect is the effect of the article, this is the deviation of the gender difference in an article from the mean gender difference over articles. By including this random effect, we model the possibility that effect sizes reported within an article are more similar than effect sizes reported in different articles. Within an article, the authors sometimes report on multiple (sub)studies. Therefore, we included a second random effect, the study-effect, modelling possible differences between studies from the same article. A third random effect is the effect of the measure that is used. By including this random effect, we account for between-measures variance, meaning that effect sizes based on the same loneliness measure might be more similar than effect sizes from different loneliness measures.

To examine whether gender differences varied according to study and sample characteristics, we conducted moderator analyses using mixed-effects models. We included the same random effects as for the mean effect analyses described above, but also included fixed effects for the moderators. All moderators were examined separately. Analyses were conducted with the procedure Mixed from SAS 9.3 using restricted maximum likelihood (REML) as estimation method (Littell, Milliken, Stroup, Wolfinger, & Schabenberger, 2006). Mean and moderating effects were statistically tested by means of a Wald test, comparing the ratio of the estimate over the corresponding standard error estimate to a *t*-distribution, with degrees of freedom estimated using the Satterthwaite (1946) method.

3. Results

3.1 Gender differences in loneliness

To examine gender differences in loneliness, we conducted three analyses. First, when focusing only on the 457 effects for which sufficient information was available to calculate a standardized mean difference, we found a close-to-zero mean effect of $g = 0.07$ ($SE = 0.03$, 95% CI [0.02, 0.12]). Although the size of the overall effect is small, it is statistically significant at the .05 significance level, $p = .008$, suggesting that males are slightly more lonely than females. Second, when the analysis was based on all 662 effects, thus, including the effects for which we had to make assumptions, results yielded a slightly lower, but similar effect of $g = 0.05$ ($SE = 0.02$, $p = .004$, and 95% CI [0.02, 0.09]). Third, as an additional analysis, we focused on the largest samples with a minimum of 100 males and 100 females. This analysis, based on 334 effects, yielded a non-significant mean effect size of $g = 0.02$ ($SE = 0.02$ and 95% CI [-0.02, 0.06]).

The 662 observed effect sizes are presented in Figure 9.1, together with the 95% confidence intervals that indicate the precision of each study. Furthermore, we examined how the total variance is decomposed over sampling variance (because the sampling variance depends on the size of the study, we used the median sampling variance for this calculation), between-article, between-study, and between-measure variance. The between-study variance (0.00, $\chi^2(1) = 0$, $p = 1$) was small and not significant. Both the between-article variance (0.02, $\chi^2(1) = 468.6$, $p < .001$) and the between-measures variance (0.02, $\chi^2(1) = 245$, $p < 0.001$) were significant, each representing about 30% of the total variance. This means that effect sizes reported within an article are more alike than effect sizes reported in different articles, and that effect sizes based on the same loneliness measure are more alike than effect sizes based on different measures.

3.2 Moderation of gender differences in loneliness

We examined one continuous moderator, that is, the individualism level of the country the study was conducted in. Gender differences did not significantly vary according to this moderator, beta = -0.00 ($SE = 0.00$, $F(1, 472) = 1.66$, $p = .198$). The other moderators examined were categorical and results of these analyses are presented in Table 9.1. Most moderators did not significantly predict gender differences in loneliness, including the relationship in which loneliness is experienced, and the socioeconomic, ethnic minority/majority, and clinical status

of the sample. Significant moderators included age group, sampling area, and loneliness type, which are discussed in more detailed below.

The moderator age group was a significant predictor of gender differences in loneliness. We found non-significant mean effect sizes for children, adolescents, and the elderly, and small mean effect sizes for college students and adults, suggesting that males were somewhat lonelier than females in those two groups. Sampling area was also found to be a significant moderator, with the largest mean effect size for those studies that sampled from a single city and a non-significant mean effect size for those studies that sampled from multiple areas. However, when examining a model with both age group and sampling area as simultaneous predictors, age group remained significant, $F(4, 159) = 3.52$, $p = .01$, but sampling area did not, $F(2, 519) = 2.60$, $p = .08$.

The moderator analysis for loneliness type was based on those effect sizes that could be categorized as either intimate or relational loneliness ($k = 250$). Loneliness type was a significant moderator with a non-significant mean effect size for intimate loneliness and a small mean effect size for relational loneliness, suggesting that males experienced somewhat more relational loneliness than females. To better interpret this finding, we examined the interaction effect between age group and loneliness type and found a significant effect, $F(5, 43.9) = 3.17$, $p = .02$. Next, we examined the effect of loneliness type for each age group separately. The small number of effect sizes precluded such analyses for children and adolescents. We found that loneliness type was not a significant moderator for college students ($k = 43$), $F(1, 24.2) = 3.88$, $p = .06$, or adults ($k = 24$), $F(1, 12.4) = 0.13$, $p = .73$. Loneliness type was a significant moderator for the elderly, $F(1, 3.43) = 58.24$, $p < 0.01$, but the analysis was based on 19 effect sizes only. In the elderly, a small mean effect was found for intimate loneliness, $g = -0.22$ ($SE = 0.07$ and 95% CI [-0.37, -0.06]), suggesting that older females experienced slightly more intimate loneliness than older males. A small mean effect was also found for relational loneliness, $g = 0.17$ ($SE = 0.06$ and 95% CI [0.02, 0.33]), suggesting that older males experienced slightly more relational loneliness than older females.

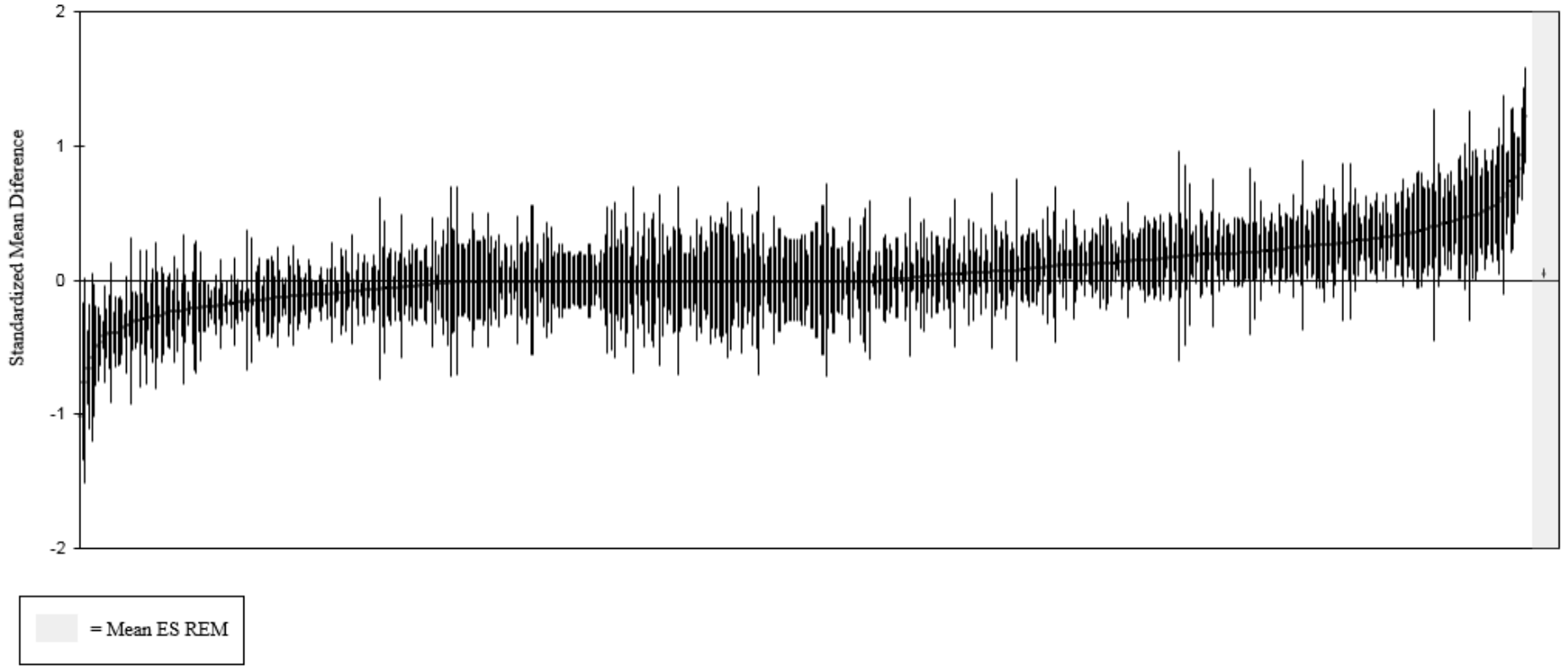

Figure 9.1. Caterpillar plot of the observed effect sizes for gender differences in loneliness with 95% confidence intervals.

Table 9.1

Separate Regression Analyses for the Moderators Predicting Gender Differences in Loneliness

Moderator	*k*	β	*SE* β	95% CI	*F*	*df*
Age	662				5.40***	4, 171
Children	102	0.02	0.05	-0.07, 0.12		
Adolescents	194	0.00	0.03	-0.06, 0.06		
College	189	0.15***	0.03	0.09, 0.21		
Adults	109	0.11**	0.04	0.05, 0.18		
Elderly	68	-0.05	0.04	-0.07, 0.12		
Loneliness type	250				7.55**	1, 56.3
Intimate	34	0.02	0.04	-0.07, 0.11		
Relational	216	0.16***	0.03	0.09, 0.22		
Relationship	234				1.43	2, 48.9
Peers	193	0.12**	0.04	0.04, 0.19		
Family	21	0.13*	0.06	0.02, 0.24		
Romantic partner	20	0.02	0.06	-0.09, 0.14		
Individualism	647				1.66	1, 472
Socioeconomic status	244				0.37	2, 184
Mostly low SES	42	0.00	0.03	-0.07, 0.06		
Mostly Middle/high SES	94	0.02	0.02	-0.03, 0.07		
Mixed SES	108	0.02	0.02	-0.02, 0.07		
Ethnic majority/minority	271				1.83	2, 201
Mostly minority	27	0.11*	0.05	0.02, 0.21		
Mostly majority	148	0.09*	0.03	0.02, 0.16		
Mixed minority/majority	96	0.14***	0.04	0.07, 0.22		
Clinical status	662				0.21	2, 659
Non-clinical	591	0.06***	0.02	0.02, 0.09		
Clinical	43	0.04	0.04	-0.05, 0.12		
Mixed	28	0.05	0.05	-0.04, 0.14		
Sampling area	589				3.75*	2, 554
Single city	344	0.06***	0.02	0.02, 0.11		
Multiple cities, single area	123	0.02**	0.02	-0.02, 0.07		
Multiple areas	122	0.08	0.02	0.04, 0.12		

Note. The regression coefficients for the categorical variables can be interpreted as the mean effect sizes for each category. *k* is the number of effect sizes in the category; β = regression coefficient; CI = confidence interval.

* $p < .05$. ** $p < .01$. *** $p < .001$.

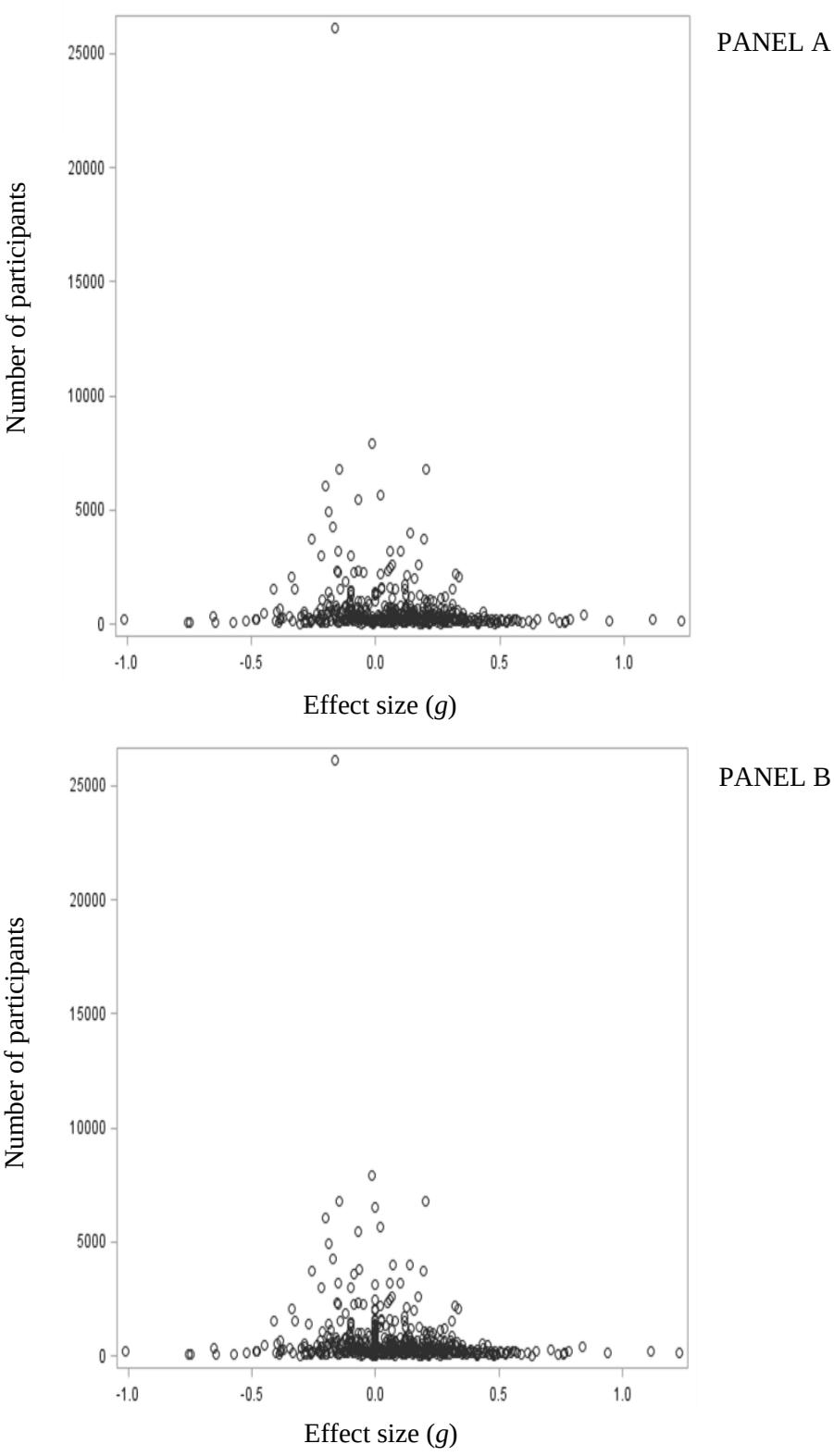

Figure 9.2. Funnel plots of effect sizes. Effect size (*g*) is plotted on the x-axis and sample size on the y-axis. Panel A represent the 457 effect sizes for which sufficient information was available to calculate *g*. Panel B represents the total dataset of 662 effect sizes.

3.3 Publication bias

We encountered a kind of reporting bias in that studies reporting insufficient statistics to calculate an effect size, remarkably often were studies that found no significant gender differences in loneliness. Furthermore, the mean effect size slightly decreased when we excluded studies with small sample sizes, suggesting that there might be publication bias as well. Therefore, we further empirically examined the presence of publication bias in two ways. First, as shown in Figure 9.2, we created a funnel plot for those studies with sufficient statistical information to compute an effect size (k = 457) and for the total dataset including the studies for which we had to make assumptions (k = 662). In the absence of publication bias, we would expect that these plots are shaped as a funnel, suggesting that as sample size increases, studies converge more closely around the true mean. The plots effectively showed more or less a funnel shape, although there seemed to be a smaller number of studies on the right side of the plot than on the left side. To test statistically whether the average observed effect size depend on sample size, we added sample size as a predictor to the model, which yielded a non-significant effect, $F(1, 296) = 2.61$, $p = .11$. Therefore, publication bias was unlikely to have influenced our findings.

4. Discussion

The present meta-analysis examined gender differences in loneliness across the lifespan. In line with the gender similarities hypothesis (Hyde, 2005), we did not find strong evidence for gender differences in loneliness. No gender differences were found for children and adolescents, and only small differences were found for college students and adults, indicating that males were slightly lonelier than females. For the elderly, the type of loneliness seemed to be of particular importance, revealing that females experienced somewhat more intimate loneliness, whereas males experienced somewhat more relational loneliness. However, an important take-home-message is that all effects were small and males and females across the lifespan seemed to be more alike than they were different.

These findings are in line with the evolutionary theory of loneliness (Cacioppo, Cacioppo, et al., 2015) and the need to belong theory (Baumeister & Leary, 1995). Every human needs to belong, and the perception that this need is not being met leads to a form of social pain - loneliness - for both males and females alike. Previous research (Boomsma et al., 2006) already showed that the degree of heritability of loneliness is the same for males and females,

and our findings suggest that, overall, the (social) environment does not lead to higher levels of loneliness in males or females either. So, loneliness seems to be a universal human phenomenon, regardless of gender.

Given that previous work - both theoretical and empirical - suggested that gender differences might be limited to certain age groups only (Koenig & Abrams, 1999; Martel, 2013; Pinquart & Sorensen, 2001a), we examined gender differences in loneliness separately for different age groups. For children and adolescents, no gender differences were found. Thus, we found no evidence for the theoretical contentions that suggested that females are lonelier than males from adolescence onwards. These theoretical contentions have been based on literature on internalizing problems in general, in which it is typically found that females have higher levels of internalizing symptoms than males from adolescence onwards (e.g., Martel, 2013; Nolen-Hoeksema, 2001). Our results suggest that females do not suffer more than males from all types of internalizing problems.

For college and university students, it has been suggested that males are lonelier than females, because the transition to college or university is more challenging for young men than young women (Knox et al., 2007; Schultz & Moore, 1986). In line with this hypothesis, we found that males in this group were slightly lonelier than females. However, this gender difference is likely not practically relevant. We found an effect size of $g = 0.15$, which means that loneliness scores of males and females differ from each other by 0.15 of a standard deviation. Another way of interpreting effect sizes, is to calculate the percentage of overlap between the distribution of loneliness scores of the two groups. For an effect size of 0.15, it would mean that 94% of the distributions of loneliness scores for males and females overlap, suggesting, again, that males and females are more alike than they are different. For adults, results also suggested that males are slightly lonelier than females, but the effect size was small and likely not practically relevant.

For the elderly, we found no overall gender differences in loneliness, but for this age group the different types of loneliness seemed to be of particular importance. Whereas elderly females reported more intimate loneliness, elderly males reported more relational loneliness. Elderly females might experience more intimate loneliness than males, because they tend to live longer than males and are, therefore, more likely to be widowed (Pinquart & Sorensen, 2001b). That finding supports previous research that found that being widowed was the

strongest predictor for romantic loneliness - a form of intimate loneliness (Drennan et al., 2008). Elderly males might experience more relational loneliness than females, as previous work suggested that males tend to orient more toward groups than females (Baumeister & Sommer, 1997; Gardner & Gabriel, 2004). Remaining in contact with a social network might become more difficult with age due to health problems and physical limitations, leading to increased levels of relational loneliness. However, the effects we found for male and female differences among the elderly, were rather small and, because most studies did not distinguish between different types of loneliness, were based on a subset of studies. Nevertheless, old age might lead to different social experiences for males and females and, therefore, to different experiences of loneliness types. Previous research found that, when controlling for these different social experiences (e.g., by focusing on nonmarried males and females only), the gender differences in loneliness disappeared (Pinquart & Sorensen, 2001b).

In addition to age category and loneliness type, we examined other sample and study characteristics that might have influenced gender differences in loneliness. Gender differences did not vary according to the relationship context in which loneliness was experienced (i.e., peers, family, or a romantic partner), the degree of individualism of the country from which the participants were sampled, or the socioeconomic, ethnic minority/majority, and clinical status of the participants. However, gender differences did vary according to the scope of the sampling area. We found the largest gender differences in loneliness for studies that sampled from a single city. These gender differences disappeared for studies that sampled from multiple cities and multiple geographical areas. However, when examining the effects of age category and sampling area simultaneously, only the effect of age category remained significant. This suggests that gender differences vary with age, rather than the scope of the sampling area.

Reviewing the literature on gender differences in loneliness across the lifespan, led us to several suggestions for future research. As a research community, we should aim to base our conclusions on a set of studies that is representative and covers the human population as well as possible. For example, almost 80% of the studies in the present meta-analysis were conducted in Western countries, with about half of these from the US. Although research outside the US is increasing, information for some parts of the world, especially Africa and South-America, is largely lacking. Also, more than half of all studies included in the present meta-analysis did not report information about the socioeconomic and ethnic status of the participants. We would like to urge researchers to include information on these demographic characteristics of their sample

in their research reports. Of those studies that did report such information, only 18% included samples with mostly participants of low SES and only 10% included samples with mostly participants from an ethnic minority group. Furthermore, 27% of all studies focused on college or university students, which represents a very specific life period that is only experienced by a limited number of people, typically people with higher SES and belonging to the majority group (Henrich, Heine, & Norenzayan, 2010). Of these studies, 25% did not report from which faculty the students were sampled. Of the studies that did report such information, 66% of the samples included only students from the humanities (mostly psychology students). Overall, we strongly suggest future research to report on demographics of the sample, and to include populations that are less frequently studied and more difficult to reach, in order to expand our knowledge base and generalize findings.

Consideration also needs to be given to providing sufficient statistical information regarding gender differences in future studies. When studies found a non-significant gender difference, but reported insufficient statistics to compute a standardized mean difference, we entered a conservative effect size of zero. An effect size is unlikely to be exactly zero, and it might be that all these effect sizes actually were in a certain direction. However, our results on the subset of studies with sufficient information to calculate an effect size yielded a similar, close-to-zero effect. Nevertheless, we encourage researchers to also report sufficient information for non-significant results.

Our meta-analysis indicated that most research on loneliness used the unidimensional UCLA Loneliness Scale. However, future research should distinguish different types of loneliness more systematically. Our results indicated different gender effects on loneliness in the elderly, when distinguishing between intimate and relational loneliness. For children and adolescents, we could not examine this because few studies made that distinction. Regarding the third type - collective loneliness - conceptual and empirical work is largely lacking. Distinguishing among different types of loneliness is not only of interest for gender differences, but it is important in its own right. For example, previous research on adolescents found that different types of loneliness were related to problems in different domains (e.g., parenting and peer group functioning; Maes, Vanhalst, Spithoven, Van den Noortgate, & Goossens, 2016) and to different forms of psychopathology (Lasgaard, Goossens, Bramsen, Trillingsgaard, & Elklit, 2011). Related to this point, note that we focused on gender differences in mean levels

of loneliness. It may be that sources and outcomes of (different types of) loneliness differ for males and females.

Distinguishing among different types of loneliness is of importance for researchers and practitioners alike. Overall, our results do not suggest that males or females are lonelier. Thus, researchers, policy makers, and practitioners should not assume males or females to be more lonely and should develop and offer interventions for both; when we let our prejudices about gender influence us, it means the group we view as less lonely risks receiving less recognition and treatment by professionals (Borys & Perlman, 1985). Our results suggest that males and females are equally lonely and advertisements of services and interventions should be directed to both. However, this does not mean that we should assume a "one size fits all" intervention. Different types of loneliness may need different intervention strategies.

To conclude, our review into gender differences in loneliness covered 37 years of research, including samples with various socioeconomic, ethnic minority/majority, and clinical status from 37 countries. Our findings highlight the importance of examining those differences across the lifespan while taking different types of loneliness into account. Overall, we did not find strong evidence for gender differences in loneliness, suggesting that males and females are more alike than they are different in this regard.

10

General Discussion

Einsamkeit, du Qual der Hertzen,
du verderbst mir alle Lust.
Will ich nur ein wenig schertzen,
finden sich die größten Schmertzen
in der abgezehrten Brust. Einsamkeit,
du Qual der Hertzen,
du verderbst mir alle Lust.

(Johann Philipp Krieger, An die Einsamkeit)

1. Loneliness in Adolescence: Types, Measurement, and Vulnerable Groups

The present dissertation focused on loneliness in adolescence and addressed three understudied topics. Specifically, we (1) examined whether different types of loneliness could be distinguished; (2) investigated psychometric characteristics of a multidimensional loneliness measure; and (3) checked whether health status and gender constitute a risk for loneliness. In this first section of the final chapter, we highlight and discuss the main findings in light of these three understudied topics. In the next section, we build on these main findings and take a broader perspective on the field of loneliness research, while discussing current limitations and providing suggestions for future research.

1.1 Distinguishing among different types of loneliness

Although researchers increasingly acknowledge the multidimensional nature of loneliness, types of loneliness are still an understudied topic. The present dissertation focused on intimate loneliness (i.e., the feeling of lacking a close, intimate attachment to another person) and relational loneliness (i.e., the feeling of lacking a network of social relationships). Specifically, in Part 1 of this dissertation, we examined whether these two types could be distinguished in both the family and peer context. Using cluster analysis, we identified groups of adolescents with similar patterns of scores on intimate and relational loneliness, for which we found evidence in three independent samples covering about 1,800 adolescents in total (Chapter 2). One of these groups comprised adolescents that felt lonely in relation to their peer group (i.e., a form of relational loneliness), but not in relation to their parents (i.e., a form of intimate loneliness). In contrast, another group of adolescents experienced loneliness in relation to their parents, but not to their peer group. Based on these findings, however, we could not determine whether the distinction between intimate loneliness in relation to parents and relational loneliness in relation to peers was related to a difference in context (i.e., parent versus peer context) or a difference in type of loneliness (i.e., intimate versus relational loneliness). Therefore, in another study, we zoomed in on the peer context specifically and focused on eight subscales of six established loneliness measures (Chapter 4). Evidence was found for a distinction between intimate loneliness (i.e., in the dyadic context of friendship) and relational loneliness (i.e., in the broader context of the peer group).

We further empirically validated this distinction between intimate and relational loneliness in adolescence by examining whether adolescents experiencing different types of

loneliness also reported differently on several aspects of well-being. Using a multi-informant approach, including parent-, peer-, and self-reports, we found that adolescents who experienced loneliness, regardless of the specific type, showed a less adaptive pattern of correlates than adolescents who did not experience loneliness (Chapters 2 and 3). With respect to different types of loneliness, our results showed that adolescents who experienced loneliness in relation to their parents reported lower responsiveness and higher psychological control from both mother and father than adolescents who experienced loneliness in relation to their peers. Furthermore, adolescents who experienced loneliness in relation to their peers reported fewer friendships and lower friendship quality, were less liked by their peers, and were seen as shyer and more often victimized as compared to adolescents who experienced loneliness in relation to parents. Note that the present dissertation as well as most previous work on loneliness, has used a cross-sectional design. It is therefore unclear for many correlates of loneliness whether they are risk factors or rather consequences of loneliness (or both).

The findings of the present dissertation suggest that adolescents can experience different types of loneliness, which has significant implications for both research and clinical practice. First, we would like to emphasize that it is important for researchers and clinicians who wish to use a particular loneliness measure, to be aware of the type of loneliness that is assessed by that measure. For six established loneliness measures, we specified which types of loneliness they assess. However, for other measures it remains unclear which type of loneliness they tap into. Knowing which type is assessed by which measure is also important for researchers and clinicians who do not wish to distinguish among different types of loneliness. For example, neither of the two most commonly used loneliness measures, that is, the Children's Loneliness Scale (CLS; Asher & Wheeler, 1985) and the UCLA Loneliness Scale (UCLA; Russell, Peplau, & Cutrona, 1980), have been explicitly developed to tap into a specific type of loneliness, or have been thought of as such. Our results, however, showed that whereas the UCLA covers both intimate and relational loneliness, the CLS tends to focus on relational loneliness only. So, when using the CLS, researchers and clinicians may unintentionally miss out on individuals experiencing intimate loneliness.

Second, we would like to emphasize the importance of distinguishing among different types of loneliness. Our results showed that different types were associated with problems in different domains, which is in line with previous research (DiTommaso, Brannen, & Best, 2004; Lasgaard, Goossens, Bramsen, Trillingsgaard, & Elklit, 2011; Scharf, Wiseman, & Farah,

2011). Although we did not examine whether intimate and relational loneliness as experienced within the peer context were differently associated with problems in different domains, we know from previous research that adolescents who experience these types of loneliness report different problems in peer functioning (Hoza, Bukowski, & Beery, 2000). Specifically, intimate loneliness was more strongly associated with lower friendship quality (i.e., a dyadic peer index) than relational loneliness. Relational loneliness, in contrast, was more strongly related with lower peer preference, which is a measure of group acceptance (i.e., a group peer index). In sum, our results suggest that different groups of adolescents experience different types of loneliness. Moreover, adolescents experiencing a particular type of loneliness seem to encounter different problems than adolescents experiencing another type of loneliness. It is yet unclear whether adolescents experiencing different types of loneliness would also be in need of different interventions – a question that will need to be addressed in future work.

1.2 Examining psychometric properties of a multidimensional loneliness measure

To assess different types of loneliness, the Loneliness and Aloneness Scale for Children and Adolescents (LACA; Marcoen, Goossens, & Caes, 1987) was developed and has been used in very diverse groups. To compare findings obtained in different groups, it is important to know whether a measure behaves similarly across these groups. Therefore, in Part 2 of the present dissertation, we examined psychometric properties of the LACA, which has been commonly used in adolescent samples. Specifically, we examined whether this multidimensional instrument is equally reliable and measures the same underlying concepts across age, gender, and cultural groups. Using a reliability generalization technique, we examined the reliability of scores, as captured by Cronbach's alpha, obtained with the LACA in studies that have used this measure in a diverse set of contexts (Chapter 5). A total of 41,076 participants from 79 studies that comprised 92 samples were included in the analyses. For both intimate loneliness (in relation to parents) and relational loneliness (in relation to the peer group), we found that the average reliability across samples was good (i.e., $\alpha = .87$ for both types of loneliness). We further found that the alphas for both subscales were somewhat lower for adolescents, as compared to children, but still above the commonly accepted reliability benchmark of .80. Regarding gender, no differences in reliability scores were found. Regarding the subscale assessing relational loneliness, we found somewhat lower reliability scores (but still above .80) for studies that used the LACA in Dutch as compared with studies that used the

LACA in another language. In sum, the results of the present dissertation show that reliability scores obtained with the LACA are good across the different groups studied.

In addition, we examined whether the LACA assesses the same underlying concepts across different age, gender, and cultural groups. Based on data of almost 9,700 Belgian adolescents, covering Grade 5 to 12 and freshman college students, we established measurement invariance across gender and age groups (Chapter 6). Furthermore, we established measurement invariance across Belgian and Chinese adolescents (Chapter 7). So, our results imply that the items as well as the underlying latent factors of the LACA are interpreted similarly by boys and girls, by participants from different stages in adolescence, and by adolescents from two very different cultural groups. LACA scores can thus be meaningfully compared across the groups studied.

Establishing measurement invariance is a necessary prerequisite for any between-group comparison (Chen, 2007; Van de Schoot, Lugtig, & Hox, 2012). Evidence on measurement invariance is increasing for other loneliness scales as well, such as the CLS (e.g., Ebesutani et al., 2012; Ritchwood, Ebesutani, Chin, & Young, 2016) and the UCLA (e.g., Allen & Oshagan, 1995; Goossens, Klimstra, Luyckx, Vanhalst, & Teppers, 2014). Although these psychometric studies are of significant value to the field, establishing measurement invariance should not be addressed in such studies only. Rather, we urge researchers to examine measurement invariance every time they wish to compare groups and report the results briefly, for example, in the Method section (as was done in Chapter 4).

1.3 Identifying vulnerable groups

Because of the detrimental effects of loneliness and the social pain it involves, it is important to identify groups that might be especially vulnerable to experiencing loneliness. Two factors that have often been mentioned as a risk for loneliness are health status and gender. However, previous studies have yielded inconsistent results. Therefore, in Part 3 of the present dissertation, we used multilevel meta-analytic techniques to examine whether having a chronic physical condition or having a certain gender increases the risk for experiencing loneliness. Meta-analysis enables researchers to examine a mean effect across previous studies. Moreover, this technique makes it possible to examine sample and study characteristics that may moderate this effect and that are often difficult to examine in empirical studies. For instance, it can be

examined whether gender differences in loneliness vary according to loneliness type or across cultural groups.

Regarding health status, analyses covered a total of 2,286 children and adolescents with chronic physical conditions and 1,330 peers without such conditions from 39 studies that comprised 63 samples (Chapter 8). We found that children and adolescents with chronic conditions were on average somewhat lonelier than their peers without such conditions. Because all studies included in the meta-analysis used a unidimensional loneliness measure, we could not examine whether this effect would be different for different types of loneliness. We did find that the link between health status and loneliness varied according to the recruitment procedure employed for participant selection. Studies in which participants were recruited from patient organizations showed a stronger link with loneliness than studies in which participants were recruited via schools or clinical registers. It might be that recruitment via patient organizations leads to select samples (cf. Van IJzendoorn, Bakermans-Kranenburg, & Sagi-Schwartz, 2003). Individuals who voluntarily decide to join a patient organization, might be more concerned with their condition or encounter more obstacles in daily life. It could also be that individuals who feel lonely, are more inclined to join such organizations to find companions. In that case, it would be interesting for future research to examine whether patient organizations may play a role in diminishing feelings of loneliness. Although expected, we did not find a moderating effect of type of chronic physical condition. It is important to keep in mind that individuals with chronic conditions constitute a very heterogeneous group, even within specific conditions. Therefore, focusing on diagnoses might not be very helpful when examining psychological and social variables. An alternative approach that cuts across diagnostic boundaries and focuses on illness-related variables, such as illness duration and visibility of the condition, seems more promising in this regard.

Regarding gender, we analyzed 662 effect sizes (i.e., standardized mean differences in loneliness scores of male and female study participants) from 552 studies, covering a total of 323,446 individuals from childhood to old age (Chapter 9). We found a significant, but close-to-zero effect, suggesting that males are on average slightly lonelier than females. Moreover, we found that gender differences in loneliness were moderated by age and loneliness type. For adolescents as well as for children, we did not find evidence for gender differences. Unfortunately, insufficient data was available to examine the moderating role of type of loneliness for these age groups. For college students and adults, only small gender differences

were found, indicating that males were slightly lonelier than females. Type of loneliness was not a significant moderator for these age groups. For the elderly, type of loneliness seemed to matter, as we found somewhat more intimate loneliness in females and somewhat more relational loneliness in males. However, as these findings were based on only a few studies, more research in this regard is needed to reach firm conclusions. Most importantly, all effects were small, and our results suggest that males and females across the lifespan are very similar regarding mean levels of loneliness.

Our findings are also interesting in light of the gender similarities hypothesis, which states that males and females are similar on many psychological variables (Hyde, 2005). A recent review of 106 meta-analyses examining gender differences showed that the vast majority of effect sizes was small or very small (Zell, Krizan, & Teeter, 2015). In other words, males and females might not be as different as often assumed. An overestimation of gender differences may come with serious costs, such as beliefs that males and females are so different that they cannot have similar jobs or use such different communication styles that conflict resolution through good communication is impossible (Hyde, 2005, 2014; Liben, 2016). However, some researchers indicate that even if there are more gender similarities than differences, the differences that do exist could be very relevant (Zuriff, 2015). We would like to urge researchers to be equally sensitive to gender similarities and differences. When researchers wish to examine gender differences, we believe that it is of great importance to have a priori hypotheses and to report results in a transparent way regardless of statistical significance. When interpreting gender differences, it is important to keep in mind that an individual study effect might not be reproducible (Open Science Collaboration, 2015), even (or perhaps especially) when this effect was reported in a highly-cited article or received ample attention in the mass media.

2. Avenues for Future Research

In this section, we will build on the main findings of the present dissertation and take a broader perspective on the field of loneliness research. We discuss remaining gaps in the literature and provide avenues for future research. Specifically, we will first elaborate on issues regarding the conceptualization and measurement of loneliness. Second, we will discuss the generalizability of the findings of the present dissertation and of the loneliness literature in general.

2.1 Types of loneliness

"*Social species, by definition, create emergent organizations beyond the individual – structures ranging from dyads and families to societies"* (Cacioppo, Cacioppo, et al., 2015, p. 209).

A conceptual framework capturing the different types of loneliness has long been missing. Recently, a model has been proposed that distinguishes among intimate, relational, and collective loneliness (Cacioppo, Grippo, London, Goossens, & Cacioppo, 2015). This model is a valuable starting point for the development of an overarching conceptual framework of types of loneliness. However, some refinements and extensions are needed on both the conceptual and empirical level. First, collective loneliness is a rather new concept and additional research on the conceptualization of this type is needed. Second, based on previous theoretical and empirical work, different subtypes, which we will discuss in more detail below, seem to exist within intimate, relational, and collective loneliness. These subtypes have not been addressed in the conceptual model presented by Cacioppo, Grippo, et al. (2015). Addressing these issues is important when further developing and refining an overarching framework of types of loneliness. An example of what such framework could look like is illustrated in Figure 10.1 and will be discussed in more detail below. This framework serves as an example and is not meant to be exhaustive.

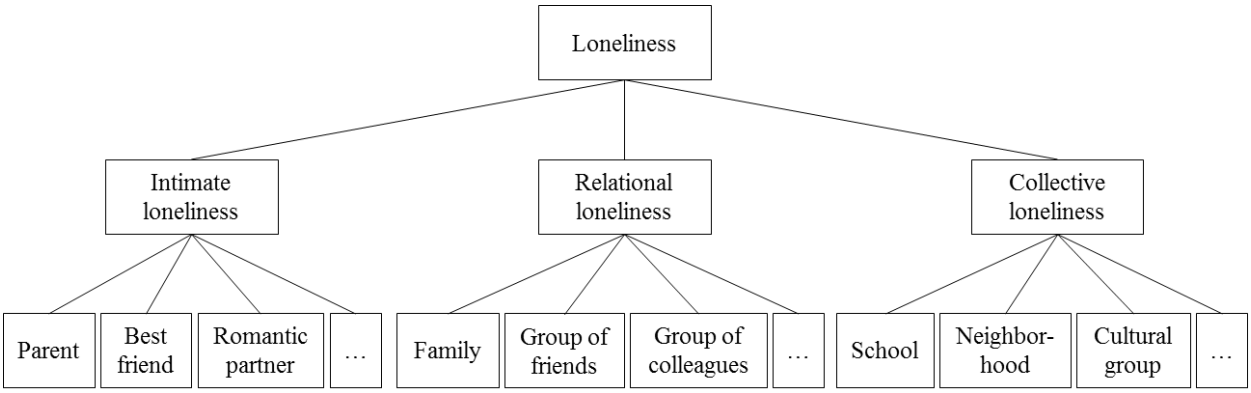

Figure 10.1. Conceptual model of different (sub)types of loneliness.

2.1.1 Collective loneliness: A neglected topic

Previous research has already paid some attention to distinguishing between intimate and relational loneliness, which were introduced by Weiss (1973). Collective loneliness, however, has received far less attention and additional research is needed to clarify the conceptualization of this type of loneliness. Collective loneliness refers to perceived deficits in one's connections with similar others who constitute broader groups, but it is unclear which groups could fit this description. Examples of these broader groups that are mentioned in the Cacioppo, Grippo, et al. (2015) paper include "school, team, or national identity" (p. 241). To tap into collective loneliness, one might refer to 'the community you live in'. However, it could also be that there are several subtypes within this broader concept of collective loneliness (see right side of Figure 10.1). For example, one might feel connected to the neighborhood one lives in, but not to the larger cultural group, or vice versa. Furthermore, as the social world of individuals expand with age, different contexts become important. A study on early adolescents included measures of school and neighborhood loneliness, and stressed the importance of examining loneliness across various ecological environments for the development of a healthy psychological functioning (Chipuer, 2001). However, research on collective loneliness and subtypes thereof is scarce and future work is needed on the conceptualization and measurement of this concept.

2.1.2 Subtypes of loneliness

Weiss (1974, 1998) hypothesized that two types of relationships can be distinguished, which each lead to a different type of loneliness: Unmet needs in attachment relationships would lead to intimate loneliness, whereas unmet needs in affiliations would lead to relational loneliness. Weiss provided several examples of these two relationships types, including parents, an intimate friend, and marriage for attachment relationships, and kin ties, friends, and colleagues for affiliations. Subsequent research extended Weiss' model by conceptualizing loneliness in specific relationships (e.g., a parent, best friend, or romantic partner) as subtypes of Weiss' broader types of loneliness (e.g., intimate loneliness). These subtypes of loneliness can be linked to important interpersonal contexts of adolescents. In the first section of this chapter, we focused on the peer context and discussed intimate loneliness (i.e., in the dyadic context of friendship) and relational loneliness (i.e., in the broader context of the peer group).

Other important interpersonal contexts include the family, romantic, and school context (Collins & Laursen, 2004; Rubin, Bukowski, & Bowker, 2015).

The family context is likely represented in both intimate and relational loneliness (see the bottom of Figure 10.1). Unfortunately, in the present dissertation, we could not examine this proposition, as we only included a measure of intimate loneliness (Chapter 2). This measure was a subscale of the LACA, which taps into loneliness in relation to parents. A drawback of this subscale is that it refers to adolescents' parents, without specifying a particular parent. This does not fit well with the dyadic nature of intimate loneliness. Moreover, as adolescents' relationships with their mothers might be different from relationships with their fathers (Russell & Saebel, 1997), it can be difficult to answer questions such as "I feel I have very strong ties with my parents" for both parents simultaneously. Other measures that might be useful in this regard are the Relational Provisions Loneliness Questionnaire (RPLQ; Hayden, 1989) and the Network and Dyadic Loneliness Scale (NDLS; Hurt, Hoza, & Pelham, 2007). To measure relational loneliness, these instruments refer to 'the family'. To measure intimate loneliness, these instruments refer to 'a member of the family'. However, it might also be important to refer to specific relationships, such as a mother, father, or sibling, as each of these family relationships have been found to have a significant impact on adolescent adjustment (Buist, Deković, & Prinzie, 2013; Smetana, Campione-Barr, & Metzger, 2006). Conceptual ideas about family subtypes of intimate and relational loneliness have been discussed in the literature, but empirical evidence for these theoretical contentions are virtually non-existent and future research is needed in this regard.

The romantic context is likely only represented as a subtype of intimate loneliness, given the dyadic nature of romantic relationships. Research on adolescents' romantic relationships is not as expansive as research on parent and peer relationships, even though romantic relationships are a significant part of adolescents' social world (Smetana et al., 2006). In fact, during adolescence, romantic relationships are both normative and salient with about half of the 15-year-olds and almost three quarters of the 18-years-olds being involved in a romantic relationship (Collins, 2003). When one is dissatisfied about not having a romantic partner or about the quality of one's romantic relationship, intimate loneliness arises in this regard. Existing loneliness measures that might be useful in this regard are the DLS and the Social and Emotional Loneliness Scale for Adults (SELSA; DiTommaso & Spinner, 1993) that both include a subscale assessing romantic loneliness. However, these measures have rarely been

used in adolescent samples. The few studies that tapped into romantic loneliness, emphasized the importance of this concept for adolescent well-being, by showing that romantic loneliness is associated with higher depression, anxiety, and suicidal ideation in high school students (Lasgaard et al., 2011) and with lower self-esteem and life-satisfaction in college students (Çeçen, 2007).

Regarding the school context, subtypes might be found for intimate, relational, and collective loneliness. Previous research, for example, emphasized the importance of classroom loneliness (Stoeckli, 2009), which is a subtype of relational loneliness, and school loneliness (Chipuer, 2001), which is a subtype of collective loneliness, for adolescent adjustment. Regarding intimate loneliness, previous research indicated that dyadic teacher-student relationships are important for both primary and secondary school students (Roorda, Koomen, Spilt, & Oort, 2011). Specifically, results of this meta-analysis showed that affective teacher-student relationships were associated with higher school engagement and achievement throughout adolescence. However, it is yet unclear whether individuals may experience loneliness in relation to their teacher. One study on early adolescents included the intimate loneliness subscales of the RPLQ regarding peer and family members, and adapted these subscales to also measure intimate loneliness in the relationship with a teacher (Konishi & Hymel, 2009). Only medium-sized correlations were found among these three subscales, suggesting that different forms of intimate loneliness were indeed captured. With the exception of this study, to our knowledge, no research has examined whether students may feel lonely in relation to their teacher. More work in this regard is needed, as it might be that students who experience loneliness in relation to their teacher show less school engagement and achievement.

2.1.3 Interrelations among loneliness subtypes

Recall that, according to the social needs perspective (Weiss, 1974, 1998), different types of relationships may satisfy different social needs, and consequently deficits in certain needs (e.g., attachment) may lead to specific types of loneliness (e.g., intimate loneliness). Moreover, as noted above, different subtypes might be distinguished for each type of loneliness. If that is indeed the case, two important questions need to be considered in future research. First, research is needed to examine whether different social needs are satisfied by different relationships or by different *types* of relationships. For example, do relationships with a parent, a best friend, and a romantic partner (i.e., three types of intimate relationships) all contribute to

the same social needs, or are these relationships rather distinctive, contributing to different social needs?

Second, if we assume that relationships within a specific type all serve the same social needs (cf. Weiss, 1998), it would be interesting to examine whether subtypes within each of the three broader types of loneliness could serve a buffering function. For example, if an adolescent's relationship with a parent does not meet the social need of attachment, but the relationship with a best friend does meet this social need, would this adolescent experience intimate loneliness? Hypotheses regarding this question can be derived from research on adolescents' relationships, where two distinct models have been discussed (Laursen & Mooney, 2008). *Threshold* models view relationships as redundant resources and state that a single high quality relationship should buffer against adverse consequences associated with other lower quality relationships. According to this model, an individual would not feel intimately lonely, as long as this individual has one close, intimate attachment to another person, regardless of who this person is. *Additive* models, in contrast, see relationships as additive resources and state that well-being should improve with each high quality relationship. According to this model, a person who has one close, intimate attachment to another person feels less intimately lonely than someone who does not have such an attachment. This same person, however, would feel more intimately lonely than someone who has multiple close and intimate attachments.

2.1.4 A new measure of types of loneliness

To advance the field of loneliness research, a new measure is needed for several reasons. First, different loneliness measures are used in the literature to assess similar types of loneliness. However, these measures each have their own format of items and answering categories. Comparing findings across individual studies is methodologically challenging when different instruments have been used, as the differences obtained might be due to real differences or to characteristics of the instrument used. For example, it is yet unclear whether the maximum score of a particular scale reflects the same underlying feeling as the maximum score of another scale. Another striking difference between the measures used is that some tap into frequencies using answering categories such as those ranging from 'never' to 'always'(e.g., the CLS, LACA and UCLA). Other measures, however, tap into the degree of agreement using answering categories such as those ranging from 'strongly disagree' to 'strongly agree' (e.g., the DLS and

SELSA). A single, comprehensive measure will greatly facilitate the comparability and integration of findings across studies.

Second, almost none of the existing loneliness measures include only items tapping into one particular loneliness type. For example, the UCLA includes items on both intimate loneliness (e.g., "How often do you feel that you are no longer close to anyone?") and relational loneliness (e.g., "How often do you feel part of a group of friends?"). Another example is the LACA with subscales that are thought of as assessing intimate loneliness (in relation to parents) and relational loneliness (in relation to the peer group). Most items of both subscales indeed assessed the associated loneliness type, but a few items do not. For example, the subscale reflecting intimate loneliness also contains the items "My parents share my interests" or "At home I feel at ease", which seem to assess relational loneliness. The subscale reflecting relational loneliness also contains the item "I think there is no single friend to whom I can tell everything", which seems to assess intimate loneliness. The same critical reflection holds for most other existing loneliness measures as well, and subscales only tapping into a single (sub)type of loneliness are rare – if not nonexistent.

Third, and perhaps most importantly, is the problem of overlapping and confounding content of items, as many loneliness measures include items tapping into the hypothesized causes of loneliness. Examples of such items are "I have lots of friends in my class" (reverse scored; CLS), "I have an active love life" (reverse scored; DLS), "Making friends is hard for me" (LACA), and "How often do you feel shy?" (UCLA). Such overlapping content between measures of loneliness and measures of hypothesized causes of loneliness (e.g., having friends) likely results in an overestimation of the association between the two. Moreover, such items do not seem to correspond with the definition of loneliness that is generally employed in the literature and focuses on a *perceived discrepancy* between one's actual and desired social relationships. As long as someone is satisfied with one's social relationships, someone who does not have "lots of friends" would not feel lonely. For a measure of loneliness, it is important that the items reflect this subjective sense of dissatisfaction. Some examples of such items can be found in the existing loneliness measures: "I really feel that I belong to my family" (reverse scored; DLS), "I want to be better integrated in the class group" (LACA), and "I wish I had a more satisfying romantic relationship" (SELSA).

A new measure that addresses these issues would be of great significance for the field of loneliness research. Moreover, it would be very valuable for future research if this new loneliness measure would include comparable versions for different age groups across the lifespan. Currently, comparing findings across age groups is challenging, as research traditions focusing on specific age groups have used different measures. So, differences obtained might be due to real age differences or to characteristics of the instrument used. Moreover, such a measure would be of great value for studies using longitudinal designs that cross boundaries between developmental periods.

In sum, we would like to urge loneliness researchers to distinguish among types of loneliness. More research is needed on the conceptualization and measurement of collective loneliness, and on subtypes within each type of loneliness. Finally, to advance the field of loneliness research, developing a new, comprehensive measure that taps into the different (sub)types of loneliness and includes comparable versions for different age groups across the lifespan, would be of great significance.

2.2 Generalizability of loneliness findings

"The fact that the vast majority of studies use WEIRD participants presents a challenge to the understanding of human psychology and behavior" (Henrich, Heine, & Norenzayan, 2010, p. 29).

As in other research domains, studies on loneliness have mainly been conducted with individuals from Western, educated, industrialized, rich, and democratic (WEIRD; Henrich et al., 2010) societies. The present dissertation is also limited in this regard, as the empirical studies and the studies included in the meta-analyses mainly included Caucasian middle class participants. Caution is therefore warranted when generalizing our findings to groups that were not studied. Although there is a long way to travel before loneliness research reflects the full breadth of human diversity, the field is making significant progress. For example, an increasing number of studies comes from non-Western countries (from about 1.5% in 1980-1989 to about 15% in 2000-2009). Moreover, loneliness research increasingly includes age groups across the lifespan (e.g., studies on adolescents increased from about 9% in 1980-1989 to about 22.5% in 2000-2009). This increased diversity in the loneliness literature enables researchers to examine whether the current knowledge on loneliness can be generalized across macro level variables.

For example, using meta-analytic techniques, it would be possible to examine overarching patterns in loneliness across diverse groups, including age and cultural groups.

Regarding age differences in loneliness, many researchers, policy makers, and practitioners still assume loneliness to be a problem of the elderly, thereby overlooking the importance of this phenomenon for younger age groups. In fact, it has been hypothesized that loneliness peaks during old age, but also during adolescence. It is during these developmental periods that changes in the social environment are accompanied by major physical and psychological developmental shifts (Qualter et al., 2015). For example, during adolescence, youth enter puberty and encounter the developmental task of forming their identity. During old age, individuals are confronted with increased frailty and decreased mobility accompanied by the loss of loved ones (Qualter et al., 2015). However, strong empirical evidence for this proposition is lacking. Most available evidence for age differences in loneliness stems from cross-sectional studies including multiple age groups (e.g., Chapter 6) as well as from longitudinal studies following a specific group of participants over a relatively short period of time. In these studies, age and cohort effects are often confounded and none of them covers the whole lifespan. An interesting avenue for future research would be to conduct a cross-temporal meta-analysis (cf. Twenge, 2001), which would permit the empirical testing of age differences in loneliness across the lifespan and an examination of whether these patterns are similar for the different types of loneliness.

Regarding cultural differences in loneliness, it is unclear whether loneliness is more apparent in certain cultures than in others (Chapter 7). Culture can be operationalized in many ways, but a frequently employed indicator is a country's level of individualism. Countries across the world vary greatly in levels of individualism, but there is no consensus yet about whether the prevalence of loneliness is higher or lower in more individualistic cultures (Chen et al., 2004; Lykes & Kemmelmeier, 2014). Societies high on individualism value psychological autonomy and individuality, whereas societies low on this dimension value group bonds and interpersonal connectedness. The focus on individualism may be associated with higher levels of aloneness and possibly loneliness in high individualistic cultures. Conversely, a strong focus on interpersonal connectedness may be associated with higher expectations about social relationships and thus more loneliness in low individualistic cultures when such high expectations are unmet. However, cross-cultural research on loneliness is scarce (Hawkley, Gu, Luo, & Cacioppo, 2012), has provided mixed results (Lykes & Kemmelmeier, 2014), and has

only compared a limited number of cultures. Assuming there is sufficient variation among the included studies, meta-analysis is a very useful technique to examine differences in loneliness across cultural groups. An advantage of this technique is that it is not necessary that multiple cultures are examined within a single study. A meta-analysis will allow researchers to empirically test cultural differences in loneliness and to examine whether any such differences are similar for the different types of loneliness. Such a study advances the field of loneliness research by providing insight on the generalizability of loneliness findings across cultures.

In sum, we would like to emphasize that the results discussed in the present dissertation should not be generalized to groups that were not studied. Moreover, as a research community, we should aim to base our future conclusions on a set of studies that covers the human population as well as possible. By doing so, it becomes also possible to examine which findings are universal and which are not.

3. Concluding Remarks

Throughout the different chapters of the present dissertation, we have elaborated on research on adolescents' loneliness and gained new insights in this regard. We addressed three understudied topics by applying different state-of-the-art techniques (i.e., cluster analysis, multilevel meta-analysis, and multi-group confirmatory factor analysis), using multi-informant data (i.e., parent-, peer-, and self-reports), and including data from multiple cultural groups (e.g., Belgian, Chinese, Italian, Turkish, and US adolescents). Specifically, we found that (1) different groups of adolescents experience different types of loneliness and encounter problems in different domains; (2) a multidimensional loneliness measure, which is often used in adolescent samples, is equally reliable and measures the same underlying concepts across gender, age, and cultural groups; and (3) having a chronic physical condition is a risk factor for loneliness in some children and adolescents, whereas no such evidence was found for gender. In addition to gaining new insights, the present dissertation raised new questions. In this concluding chapter, we suggested several avenues for future research. We hope that these suggestions inspire others to extend our current knowledge and to move the field of loneliness research forward.

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References

See also:

Appendix A for references of the studies included in the meta-analysis described in Chapter 5

Appendix B for references of the studies included in the meta-analysis described in Chapter 8

Appendix C for references of the studies included in the meta-analysis described in Chapter 9

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A

Appendices

En ik hef het glas op jouw gezondheid,
Want jij staat niet alleen.

Iedereen is van de wereld
En de wereld is van iedereen.

(The Scene, Iedereen is van de Wereld)

Appendix A

References of the studies included in the meta-analysis described in Chapter 5

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Appendix C

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